ELECTRICAL REVIEW

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10th September, 1948

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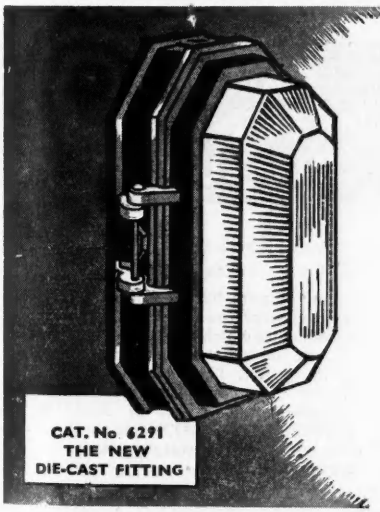

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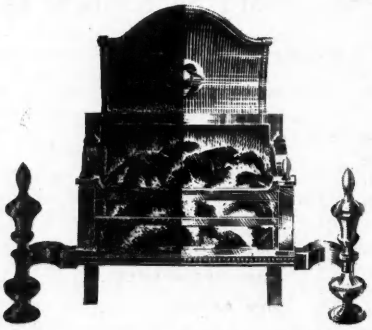

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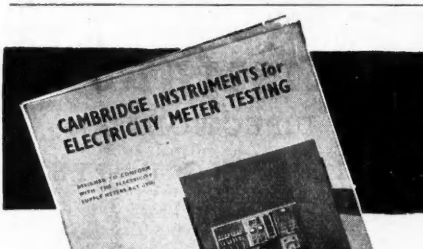

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

Vol. CXLIII. No. 3694 10th SEPTEMBER, 1948 9d. WEEKLY

Compulsory Wiring Rules

RAISING INSTALLATION STANDARDS

IT is generally agreed that an appreciable proportion of the electrical installations in houses and small commercial establishments are unsatisfactory and that "something should be done about it." Moreover the present is a suitable time for doing it. Electricity supply has been nationalized and the new authorities are in a position to insist on better standards and there is a temporary slowing-down in installation work on account of the plant shortage.

Is it practicable to introduce compulsory wiring rules here? And if it is what kind of rules should they be? The I.E.E. Regulations for the Electrical Equipment of Buildings are ready to hand; they are included as a condition in many contracts (mainly non-domestic); and they were actually made compulsory at West Ham years ago by a clause in a Corporation Act.

Thus it seems that the enforcement of the Regulations is not impossible but there are still people who regard them as too strict; too difficult for many contractors to understand; and likely to add appreciably to costs.

Institution Committee's Views

The I.E.E. Post-War Planning Committee seemed to be apprehensive of making the Regulations obligatory as they stood. The Committee said in its report (1944) that they had become "somewhat complicated." It therefore proposed that the fundamental principles should be separated from the details of application. If that were accepted, their division into Basic Safety Regulations and separate supporting codes of practice was recommended. The Basic Regulations should be in the simplest possible form to ensure an adequate minimum standard of safety and should be accompanied by a Code of Practical Interpretation.

This would prove a burdensome task which would take some time to accomplish; indeed it may be questioned whether it could ever be accomplished to the satisfaction of those principally concerned. Simplification would probably mean relaxation and when that was acquiesced in where would it end?

Inspection and Enforcement

Suppose, however, that compulsory rules were introduced—whether the complete I.E.E. Regulations or a modified version. The adoption of any compulsory code implies inspection and enforcement. Whose job would that be? The obvious answer seems to be the British Electricity Authority and the Area Boards. Already the Boards have power to refuse to connect installations which are unsatisfactory in certain respects and enforcement of the suggested regulations might be regarded merely as an extension of this power. Unfortunately the Boards themselves carry out installation work and would thus be to some extent judges in their own cause. Perhaps the remoter B.E.A. might be considered to possess the necessary impartiality. This would be an easier solution than the establishment of an independent inspectorate which might take the form of another section of a Government Department.

It is held in responsible electrical

contracting circles that compulsory rules would necessitate the registration of contractors and operatives. This view, whether right or wrong, raises another vexed aspect of the whole problem with which the B.E.A. is faced in its endeavour to secure a high standard of installation work. No doubt the Authority is devoting much attention to the subject; the results will be awaited with interest by genuine electrical contractors and with misgivings by those who have so far managed to " get away " with work which would not bear close inspection.

ANOTHER PLUG PROBLEM

THE United Kingdom Trade Commissioner in Trinidad points out that throughout the British West Indies (Eastern Group), British Guiana and Bermuda American-type flat-pin plugs are used. Many British suppliers fit appliances with British round-pin plugs which are merely discarded. It might be thought that the fitting of the right kind of plug could be left to the local dealers but it seems that American plugs are supplied on a quota basis and quantities are inadequate. Consequently local buyers are disinclined to place further orders for appliances. At least this is the attitude of the Port of Spain Electricity Board, a large retailer of appliances.

SALARIES AND SICK PAY

Now that all grades in industry are entitled to "benefit" during periods of illness the question has arisen whether the amount of this should be deducted from payments of salary during such periods. The argument is that not to deduct it is to put a premium on malingering or at least to prolong the period. The National Joint Board for the Electricity Supply Industry has decided (as an interim measure) that the amount received in sickness benefit shall be deducted in so far as it raises the total receipts by an employee above his normal salary. This does not apply until six months after 4th July where the employee has been a voluntary contributor.

ENGINEERING WAGES

THE Court of Inquiry into the engineering unions' claim for an increase of 13s. a week in the wages of their members which was rejected by the employers' federation has inevitably arrived at a compromise—an increase of 5s. a week in the national bonus. It is explained that this recommendation is not inimical to the " standstill " policy aimed at in the Government's White Paper on Personal Incomes, Costs and Prices as the claim antedated this. The Court also recommends the raising of the lower minimum rates to a common level. What the effect will be is not accurately calculable; estimates of the annual cost vary between £20 million and £30 million. The B.E.A.M.A. contract-price figure for adult male labour is at present 110s. per week; the increase which is now recommended will raise it by about 4½ per cent.

APPLYING SCIENCE

THE maintenance of proportion between long-term and applied research, coupled with engineering enterprise, is essential for avoiding wasteful lapse of time between a scientific discovery and its application. In his presidential address to the British Association Sir Henry Tizard submitted that scientific information is being accumulated more rapidly than the technique of turning it to use can be developed and that no new discovery is likely to benefit industry as quickly as the application of what is already known. Thus the spectacular possibilities of producing power from uranium will not, he believes, be so profitable as the more humdrum practical application of known methods of fuel economy.

ENGINEERING

THE need for enterprise in engineering was also urged by Wing-Commander T. R. Cave-Brown-Cave in his address as president of the B.A. Engineering Section, which was primarily intended for younger entrants to the profession. Most of the older members will probably share his view that less than half of the knowledge acquired in original training is available for coping with the diversity of problems set by advancing science. Given a thorough knowledge of fundamentals, however, engineers should develop, as the result of practical experience, a kind of intuition that enables them to estimate the cost and efficiency of new developments provided they keep abreast of them through study of publications, as he advocates.

Textile-Mill Driving—II

Electrical Applications to Rarer-Wool Materials Manufacture

IN last week's *Electrical Review* there appeared the first part of a description of the electrical applications at the mills of James Johnston & Co., of Elgin, Ltd., to the earlier processes involved in the manufacture of cloth from the rarer wools and finer qualities of sheep wools. We now propose in this concluding section of the article to deal similarly with the later processes employed for the actual production of cloth.

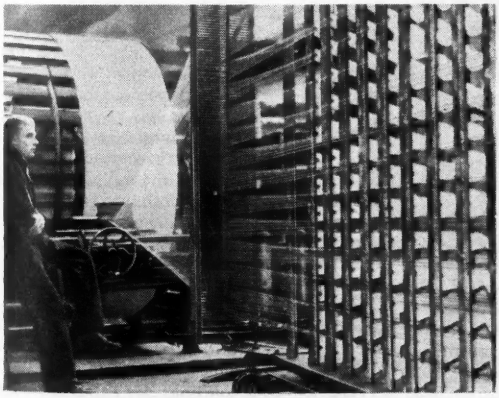
In preparation for warping the yarn from the hanks is wound into "cheeses." The hanks are stretched between pairs of spools at the bottom and at each side of the machine, while the cheeses are aligned on each side at the top of the machine and are driven by surface contact from a drum shaft on which they bear.

Sometimes two-ply yarn is called for; this is produced by a doubling operation in which the threads from two cheeses are wound simultaneously on to one bobbin and at the same time twisted together. One of these doubling machines, which will produce about 50 bobbins of two-ply yarn at the same time, is driven by a 5-h.p., 1,465-r.p.m. Green motor. There is a 2-to-1 ratio speed reducing belt transmission to a central line shaft near the bottom of the machine. This shaft carries drums from which there are individual cord transmissions up to the bobbins.

In preparation for warping the hanks are wound into "cheeses"

For producing the warping beam, which is the source of the warp threads on the loom, the cheeses are placed in their correct order, dependent on the design of the cloth, on a bank or large portable frame. From this frame the threads from the individual cheeses are run out through guides, which maintain the correct order and sequence, on to the warping mill, a very large revolving frame. The assembly of the warping threads on the mill is a meticulous operation which requires a good deal of irregular starting and stopping, so that there is no question here of precise speed control, and the fast and loose pulley scheme is thus much favoured.

From the mill the threads are run off on to the warping beam, and both the beam and the mill are served from the



From the "cheeses" on a bank the threads are run out in correct order on to the warping mill

same countershaft carrying the fast and loose pulleys. Two of these warping mill and beam assemblies and four of the double-sided winding machines referred to, immediately before the warping operation, as well as two weft shuttle winding machines, are all group driven from a 5-h.p., 1,400-r.p.m. squirrel-cage motor mounted in the roof structure, a number of countershafts with intermediate transmissions being involved.

Next follows a sequence of intricate hand operations of drawing the ends of the threads of the warping beam through the leaves and then through steel splits or reeds, all according to the design of the cloth produced on the loom to which the beam is introduced with its ends so threaded. Preparation of the weft threads for the loom involves

A sequence of intricate hand operations prepares the warping beam for the loom

winding from the spinner spindles or cops. This is a simple transfer operation and is done on machines rather similar to the other winding machines described. Two weft winding machines are included in the group drive already referred to as serving the hank-winding machines and the warping mills and beams.

The warping beam and the weft shuttles are now ready for introduction to the loom on which are carried out the intricate operations of opening out the warping threads—top and bottom and bottom and top, alternately, the shuttle carrying the weft thread moving at lightning speed through each V opening of the warp threads. About twenty looms are the subject of a group drive with a 20-h.p., 720-r.p.m. motor slung from the roof. There is a 3-to-1 belt-transmission speed reduction to a line shaft over the centre of an avenue between two lines of looms with their driving ends facing. In each case there is a 3-to-2 speed reduction down to the loom driving head pulley.

From the pulley shaft there is bevel-gear transmission to top and bottom shafts in the base of the loom. From the top shaft crank gearing is responsible for the reciprocating motion of the warping "lay," while a similar motion on the bottom shaft operates the mechanism which imparts a "kick" to the shuttle which sends it to and fro with the weft threads. There is a worm transmission within the machine for the driving head to the cloth beam shaft.

On leaving the looms the cloth is ready for a number of finishing operations which are carried out in a separate section of the works and again embrace both group and individual drives. First there are two essential inspections, one for knots, in which the cloth is passed over a desk under close scrutiny, and the other in which the cloth is placed over poles and looked through against the light; any damage detected is marked for the attention of the repairers.

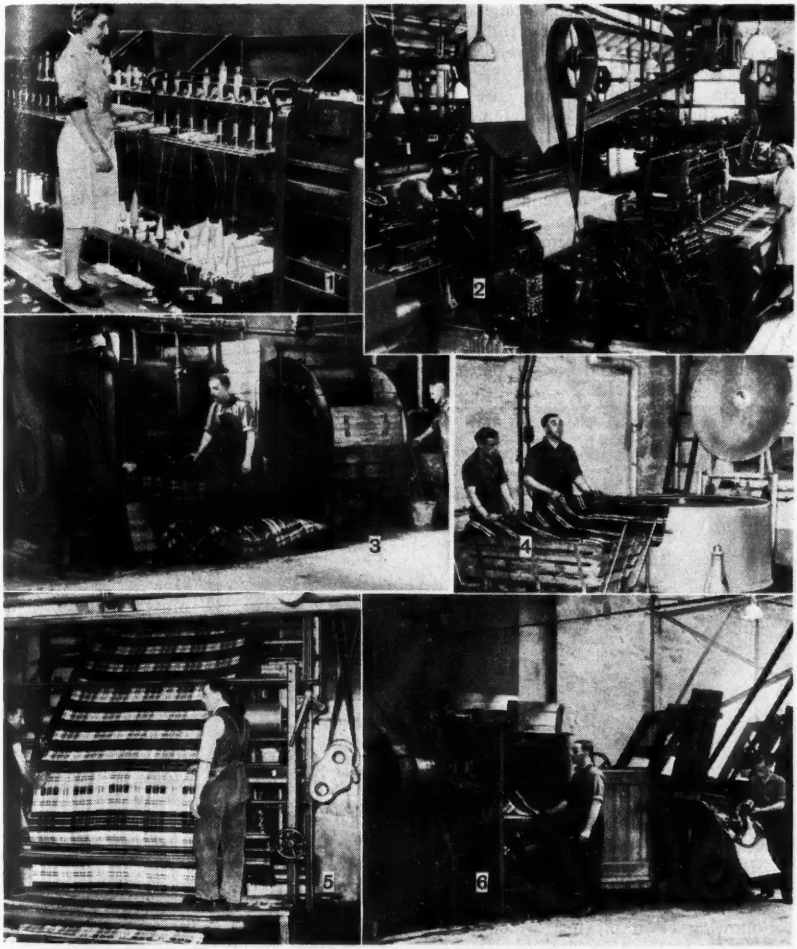
Then the cloth is scoured. For this purpose the ends of a length are sewn together, so that the length passes continuously through a pair of rollers and over a feed roller, while the remainder hangs loosely while it goes through the scouring solution in the bottom of the machine. Three scouring machines and a hydro-extractor form a 20-h.p. group drive, the motor being one of the only two slip-ring machines in the whole installation. There is first a 5-to-1 speed reduction by V-belt to a countershaft and then in each case a simple 3-to-1 belt scheme down to each machine.

The next operation of milling is a shrinking process by which the correct weight of the material is attained. In the milling machines rolls feed and pack the cloth into and through a wooden channel against some pressure, with the result that the fibres are packed close together. A group of six milling machines is served by a 40-h.p., 950-r.p.m. motor with a primary transmission at 5-to-1 speed reduction to a countershaft and secondary even-ratio individual transmissions down to the machines.

The scouring solutions are extracted from the cloth in one case by an individually driven Broadbent centrifuge. This has an

outside diameter of about 6 ft, and the perforated container which revolves in the horizontal plane is directly connected to the 750-r.p.m. motor recessed in the base of the machine.

Drying, the next process, consists of passing the cloth to and fro between banks of steam-heated pipes and round a series of rolls interleaved with the pipes. During this operation the cloth is stretched between two side members as it is passed into the drying room. The drying machine is part of a 36-h.p., 725-r.p.m. group drive which also includes four wet and one dry raising gigs, three cropping machines and a brushing machine, all for subsequent processes. In

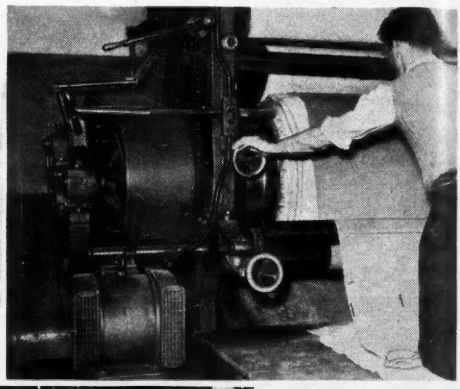


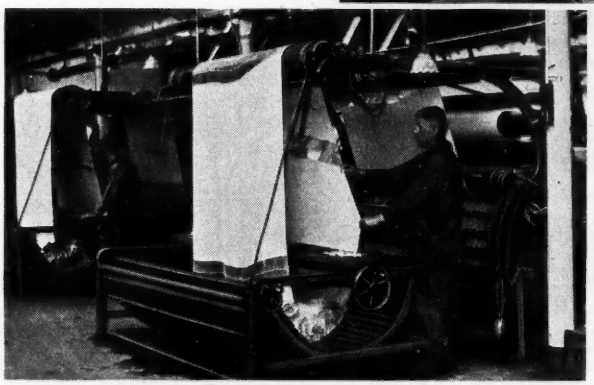
(1) Preparation of the weft threads involves winding from spindles to cops. (2) About twenty looms form a group drive. (3) In the cloth scourers the cloth passes continuously through the solution and rolls. (4) After scouring the solution is extracted from the cloth in a high-speed centrifuge. (5) The cloth is stretched between two side members as it passes into the drying room. (6) Milling is a shrinking operation by which the correct weight of material is obtained

this instance, however, there is a three-stage belt transmission to the pulley head on the machine, with a 2-to-1 speed reduction at each stage, while from the pulley head a comprehensive chain transmission system links up the various feeding rolls in the drying room. Both wet and dry nap raising are employed, but the principle is much the same, and in each case the cloth, sewn in a continuous length, is passed through a number of idle and feeding rolls over the surface of a cylinder covered with teasel spikes. There is an even-ratio transmission from the cylinder shaft to one of two line shafts incorporated in the group drive last referred to, and then a two-stage transmission back to the motor with a 2-to-1 speed reduction at each stage.

Cropping involves the removal of all the long and irregularly projecting fibres from the cloth surface by passing the cloth under the blades of a revolving-knife assembly like that of a lawn mower. Each cropping machine is driven from one of the line shafts of the group-driving scheme just mentioned, and there is a simple belt transmission scheme with a 3-to-2 speed reduction from the line shaft down to the machine driving head.

Following clean picking, which involves picking out by hand any foreign matter from the cloth while it is spread over an inspection desk, the final process is pressing or the modern equivalent. Instead of the actual application of pressure to the cloth, hot steam is blown through it from the inside of a perforated cylinder on which the cloth is wound and interleaved with cotton cloth. A 7½-h.p., 705-r.p.m. motor drives this machine with transmission first by a 3-to-1 speed reduction (V-belt) to a countershaft actually on the machine. There are two secondary transmission drives from this shaft, each a combination of gear and chain.





The modern equivalent to pressing (above) is blowing hot steam through the cloth from the inside of a perforated cylinder on which it is wound Left: With the drying machine, nap raisers and cropping machines form a 36-h.p. drive

One is to the main press drum for winding on to the drum, and the other to a system of rollers at the top of the machine for winding off the drum. This completes the processes and the cloth is then passed on to the warehouse to be prepared for dispatch.

Several interesting lighting experiments have been tried, notably in the carding and spinning rooms, where general lighting by Holophane prismatic steel covered shades gives 6 ft-candles at the working plane 3 ft from the floor, the actual lamps being hidden. In the washing and milling house all-glass watertight fittings (also Holophane) give 12 f.c. at the machines and a general lighting of 6 f.c. over the rest of the building,

reckoned at 3 ft from the floor. Many other examples of special lighting are in use.

As we have indicated, practically all the motors are squirrel-cage machines and of Lancashire Dynamo & Crypto production. There is no clear line of demarcation with regard to size between direct-on and star-delta starting, because the starting torques of textile machinery vary considerably in relation to the motor sizes.

We are indebted to Mr. A. Boyd, director of the company, for explaining the processes and to members of his engineering staff for help in collecting the technical data.

"Phil. Mag." Anniversary

APART from being one of the most widely and frequently quoted scientific journals in the world, the *Philosophical Magazine* has other claims to uniqueness. It is not the organ of any institution or scientific body, being independently owned by Taylor & Francis, Ltd., its printers and publishers. The international reputation it has built up in physical and mathematical circles is an enviable one and it has helped in no small way to set the high standard of printing which scientific works demand. It began as a miscellany of information, tending as the century wore on to become a journal of research, and has indeed had its share of important papers, many of fundamental worth and not a few of considerable electrical import.

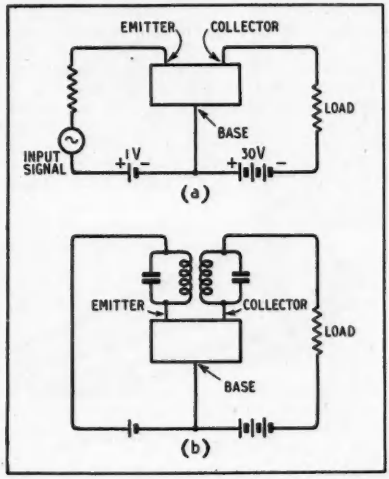
A commemoration number (price 15s.) issued to mark the 150th anniversary of the foundation of the magazine (first published in 1798) is devoted to natural philosophy through the eighteenth century. After an opening article on the journal itself and the moulders of its fortunes, there are special contributions on astronomy, physics, chemistry, mathematics, engineering and invention, instruments, periodicals from 1665 to 1798, the scientific societies of the time and the teaching of the physical sciences, then mainly done in medical and military academies with very perfunctory studies at the universities.

The Transistor

SEVERAL American technical journals have recently described a new type of amplifying element which has been developed by the Bell Telephone Laboratories, Inc., New York. Housed in a cylinder, which is less than an inch long, the device is known as the "transistor" and like the radio valve it will function as an amplifier or oscillator. It has been shown to effect amplification as high as 20 db and some models have been operated as amplifiers at frequencies up to 10 Mc/s.

Among many interesting applications, a valveless radio receiver has been shown to operate successfully when using transistors as amplifiers and a point contact rectifier as a detector. A transistor has also been employed to generate a standard frequency, thus demonstrating its ability to oscillate.

Essentially it comprises two point contacts of the "cat's whisker" type made 0·002 in. apart on the surface of a semi-conducting material, usually germanium. The input impedance is of the order of 1,000 ohms and the output impedance about 10,000 ohms. It is thus evident that the device is not electrically identical



Two typical transistor circuits: (a) amplifier (b) oscillator

with the radio valve. The power handling capacity of the units which were demonstrated in New York was 50 mW and the power consumption about 0·1 W. It is also said that the device is little affected by ordinary changes in temperature and that such characteristics as life, robustness and stability are expected to be about the same as those of point contact rectifiers.

The amplification process in the transistor is caused by the fact that the input contact or "emitter" is surrounded by an area of interaction, within which the electronic structure of the semi-conductor is modified by the input current. The output contact, which is called the "collector," is situated in this area. The output current can, therefore, be controlled by the input current, thus producing the basic mechanism of amplification.

Smoke Abatement

Mr. Hugh Gaitskell, the Minister of Fuel and Power, will address the annual conference of the National Smoke Abatement Society, which will be held at Cheltenham on 30th September and 1st October.

Public Lighting Exhibition

RECENT IMPROVEMENTS IN DESIGN

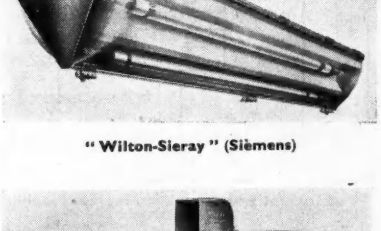
IN conjunction with the twentieth annual conference of the Association of Public Lighting Engineers which is being held at the Winter Garden, Eastbourne, from Monday to Friday next an exhibition has been organized at which the latest types of street lighting equipment will be on view.

Fluorescent fittings are naturally conspicuous, and to the previous range have been added smaller lanterns suitable for residential areas. Two attractive designs of this kind, for 2-ft 40-W lamps, are displayed by the General Electric Co., Ltd. One type accommodates four vertical-burning lamps, enclosed in an opal "Perspex" cylinder; the other is for two horizontal lamps, light control being obtained by curved reflectors. The company is also showing a new open-type lantern for side streets, designed for use with 60/200-W filament or 80/125-W h.p. mercury lamps. It has a sloping side-entry mounting so that it can readily replace G.E.C. "Facet" two-way directional lanterns when three- or four-way distribution is required, the new type then being provided with a dome refractor to give a symmetrical light distribution.

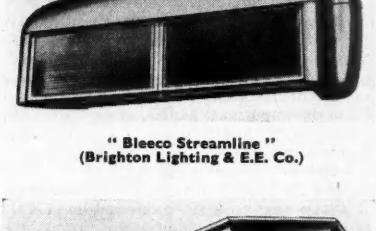
In addition to the "Sol-Etern" lantern for two 5-ft fluorescent lamps, the Revo Electric Co., Ltd., is exhibiting a fitting for two 20-W 2-ft lamps which, in conjunction with the company's "Myron" 15-ft artificial stone column, presents a pleasing combination for Class "B" roads. The "Blendalite" unit for sodium and tungsten lamps is also being shown.

A prominent feature of the British Thomson-Houston Co.'s display, the "Mazdalux" fluorescent lantern has undergone a number of improvements in design and mechanical construction since it was first shown to A.P.L.E. delegates in 1946. Equipment of this type is now to be seen in many towns at home and abroad. To meet the demand for a complete range of side-entry lanterns accommodating every size of vertically operated mercury vapour and gas-filled lamp, the company has introduced its "Series 600," enabling lanterns of uniform appearance to be installed throughout a town. Horizontal open and enclosed lanterns for 45/140-W sodium lamps are among other designs exhibited.

Of special interest on the stand of the Engineering & Lighting Equipment Co., Ltd., is a three-light 80-W tubular fluorescent fitting especially applicable to shopping centres, promenades, etc., where colour rendering is important. A unit for horizontal-burning mercury lamps incorporates an optical system complying with the requirements for street lighting near airfields; a side-entry bowl type refractor fitting for vertical mercury lamps has an adjustable suspension assembly permitting



"Wilton-Sieray" (Siemens)



"Bleeco Streamline" (Brighton Lighting & E.E. Co.)

Simplex "Arteria"

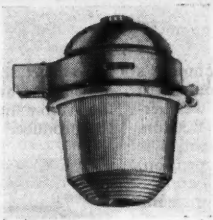
Revo colour correcting Unit

accurate alignment with the road; and the "Golden Ray" sodium lantern has been given a smarter appearance while maintenance has been facilitated.

A neat and compact fitting for three 80-W fluorescent lamps is the new "Wilton-Sieray" exhibited by Siemens Electric Lamps & Supplies, Ltd. The lantern, which complete with gear weighs 65 lb, is arranged in four simple sections—aluminium frame, control gear platform, anodized aluminium reflectors and "Perspex" doors. Among the "Sieray" range there is also the new "Euston-Sieray" lantern for use with horizontal-burning mercury lamps.

The principal exhibit by the Metropolitan-Vickers Electrical Co., Ltd., is the new "S.O. Fifty" lantern which is believed to be the first all-"Perspex" totally enclosed refractor street lighting fitting. The hood, shaped from $\frac{1}{16}$-in. thick dense opal "Perspex," is supported by a two-part cast aluminium alloy rib; hinged to this is a bowl of thick clear "Perspex" to the sides of which refractors of the same material are sealed. The opal hood serves as an efficient diffuse reflector to the upward light so as to give a "fill-in" to the lower hemisphere distribution. The lantern, designed to accommodate an 85- or 140-W sodium lamp, is weatherproof and the smooth exterior makes cleaning easy. The complete unit weighs only 17½ lb.

Lanterns for Class "A" roads shown by the Brighton Lighting & Electrical Engineering Co., Ltd., include the "Bleeco W" totally enclosed reflector fitting for horizontal-burning sodium and mercury lamps embodying a novel form of downward light control. The "Streamline" prismatic panel refractor sodium lantern is designed particularly to harmonize with concrete columns. In the P.J. "Multilite Cut-Off" three gas-filled lamps in line give the advantage of a horizontal line source distribution with colour discrimination and fractional lighting when required. A similar type of lantern (No. 617) is designed for horizontal-burning sodium lamps. The "Triplite," also employing three gas-filled lamps in line, is equipped with Holophane single-piece or



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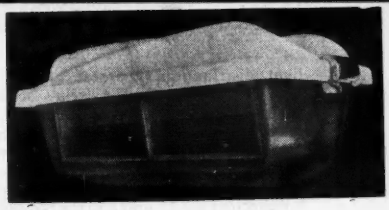

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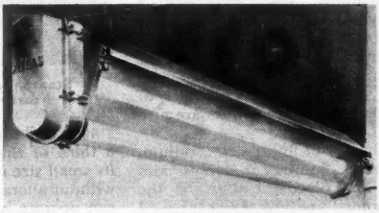

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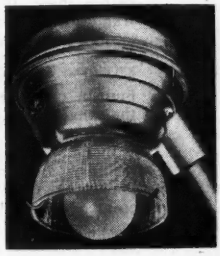
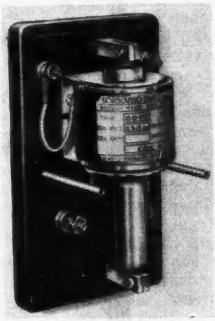


(d)

(a) Typical "Mazdalux" lantern in "600" series. (b) Metrovick "S.O. Fifty" all-"Perspex" refractor type. (c) "Atlas" fluorescent unit for Class "A" roads. (d) G.E.C. open-type lantern for side streets

"Duo-Dome" two-way refractors for high-angle directional lighting.

Ease of inspection for the individual units has been given special attention by the Simplex Electric Co., Ltd., whose display includes an "exploded" street lighting fitting. The "Refrax" lantern for use with mercury or filament lamps has a refractor bowl and interior reflectors which ensure a wide and adequate



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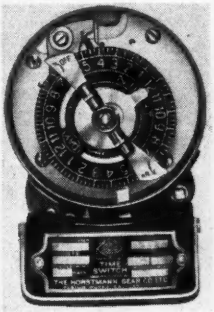

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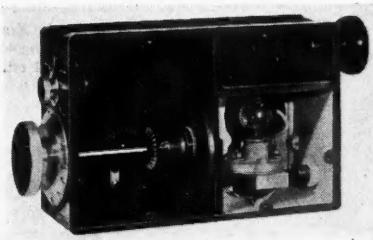


(d)

(a) Standard 50-A Sordoviso contactor. (b) Horstmann type V time switch. (c) Venner stair lighting time switch. (d) Holophane type 48 "Lumeter"

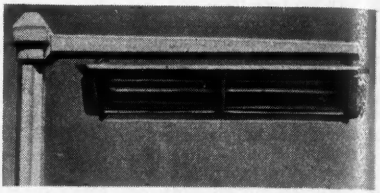
light distribution. Largest of the company's fittings on view is the " Arteria " sodium lantern for main highways. Sturdily built and weather-proof, it is designed to give maximum freedom from glare. Because of its light weight it is particularly suitable for central suspension. Other exhibits on the company's stand are the " Reflecto-Flood " unit and the Simplex prismatic bulkhead fitting.

The new " Atlas " fluorescent unit of Thorn Electrical Industries, Ltd., for Class " A " roads carries three 80-W lamps. Constructed with a framework mainly of aluminium alloy, the lantern is dust and insect proof, has a one-piece " Perspex " cover without glazing bars, and the assembly is completely self-contained with built-in concealed control gear. Examples of the range of " Atlas " fluorescent tubes are also shown.

Included in the display of fluorescent, sodium, mercury and mercury-fluorescent lamps and apparatus by Philips Electrical, Ltd., is the company's new blended lighting lamp supplied in two ratings, 160 and 250 W. It requires no apparatus, as the tungsten filament component acts as a resistance ballast, and can therefore be used to replace lamps in existing tungsten fittings to improve the quantity and quality of the light.

" Bi-Multi " reflectors for use with tungsten filament, mercury and sodium lamps are to be seen on the stand of the Electric Street Lighting Apparatus Co. A characteristic example is the " AL/1HS " for horizontal-burning 45-W sodium lamps, combining simplicity and efficiency with ease of maintenance.

To meet the demand for a relay of smaller dimensions and lower cost for ripple control, the Automatic Telephone & Electric Co., Ltd., has produced a new " Rythmatic " design, type



Stanton Ironworks type 6K bracket arm carrying B.T.H. fluorescent unit

" 46 V.S.," the cubic capacity of which is barely a third of that of the 1936 relay. Because of its small size it can readily replace time switches without alteration of the lamp standards, and it can operate on existing " Rythmatic " installations with only slight modification of the control equipment.

On a board in the form of a map of a small township with streets lighted by miniature lamps, Sordoviso Switchgear, Ltd., is demonstrating delay cascade lighting in four steps for outlying areas and whole-night and part-night lighting in the town centre on " Sordomatic " control. The company has recently marketed a redesigned range of standard contactors of greater robustness.

The exhibit of Measurement, Ltd., comprises a scale model of an " Actadis " ripple control installation, together with a 12-frequency reed stabilized oscillator controlling relays on a demonstration panel, and typical relays.

Special attention is drawn by Venner Time Switches, Ltd., to the " GP " switch which is available as single, double and triple pole and provides for multi-circuit switching arrangements. It can be fitted to any of the company's standard range of clocks. The " Cyclo-Hour " meter has been found increasingly useful in determining the number of hours that a lighting circuit has been in operation. A stair lighting display demonstrates the application of the standard synchronous motor-driven solar dial

Left : Stewarts & Lloyds tubular steel fluted column. Centre : Broads " 441A " lighting column. Right : " Adastra " sectional column

time switch type "MSSL" in blocks of flats.

The range of instruments being exhibited by the Horstmann Gear Co., Ltd., includes one in which the electric-wind movement is powered by a 200-r.p.m. synchronous motor. As well as winding the spring and ensuring a seven-day reserve run, the motor vibrates an arm which transmits synchronous impulses to the balance so that the movement beats in sympathy with the a.c. frequency.

Synchronous pattern time switches, including the solar dial type, are being shown on the stand of Sangamo Weston, Ltd., together with a wide variety of measuring instruments, including photometers.

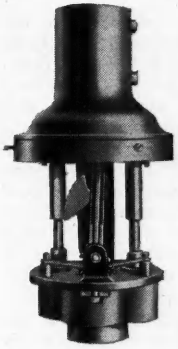
Time switches are also being displayed by the British, Foreign and Colonial Automatic Lighting Controlling Co., Ltd., whose stand is being arranged in the form of a communal centre.

Lighting Columns

On the rink adjoining the Conference Hall a selection of lighting columns of up-to-date design will be on view. They include examples of the concrete type such as those by Spun Concrete, Ltd. (incorporating a new slim base chamber with flush-fitting concrete panelled door, and improved arrangement for securing the arm to the column); Concrete Utilities, Ltd. (for both Class "A" and "B" roads, including columns specially designed to carry fluorescent lanterns); and the Stanton Ironworks Co., Ltd. (spun concrete columns produced by the centrifugal process, with a smooth granolithic finish impervious to weather conditions). Besides artificial stone standards the Revo Electric Co. is showing new tubular steel columns, all approved by the Royal Fine Art Commission. Tubular steel columns are also being shown by Stewarts & Lloyds, Ltd., and "Adastra" sectional galvanized steel types in either hexagonal or circular tapering sections by Poles, Ltd. Four columns of different designs are displayed by Broads Manufacturing Co., Ltd., which is also exhibiting on its stand lighting column bases, brackets and ladder arms, etc.

Other Exhibits

Exhibiting for the first time, Cable Covers, Ltd., is showing its "Apex" self-locking cable covers, and salt-glazed earthenware Stanford jointed self-aligning conduits. The Engineering & Lighting Equipment Co. is making a special point of its raising and lowering gear. In addition to several examples of prismatic glassware, on the stand of Holophane, Ltd., there is the new type 48 "Lumeter" embodying modifications made to keep in step with developments in light sources and the need for measuring greater ranges of illumination. A "Fordson Thames" 2-ton chassis (Ford Motor Co., Ltd.) is fitted with a 25-ft three-stage tower wagon with hydraulic elevating gear incorporating a foolproof safety device. The range of illuminated signs and guardposts displayed by Gowshall, Ltd., includes a new concrete "Keep Left" bollard (in conjunction with Concrete Utilities) as well as the "Mandalite" universal lighting fitting which will externally illuminate any sign where electricity is available. In an unobtrusive cast-iron head for illuminated pedestrian crossing beacons the Brighton Lighting & Electrical Engineering Co. has incorporated a small watertight box for fuses and time switch. Other exhibits include Mersey cables (on the stand of the Simplex Co.), service pipes and mains, joints, etc. (Stewarts & Lloyds) and scale-model lighting columns and sections on the stands of manufacturers exhibiting also in the outside rink.



Raising and lowering gear shown by the Engineering & Lighting Equipment Co.

Stand No. 27, allotted to the British Electrical Development Association, will serve as an information bureau, with charts showing how the price of electricity for public lighting has fallen and the amount of light obtainable for a given expenditure increased.

B.B.C.'s Annual Report

SEVERAL important technical developments are referred to in the report of the British Broadcasting Corporation for 1947-48 (H.M. Stationery Office, 6d.). Construction was begun at Wrotham of a high-power experimental station for broadcasting on ultra-short waves, and at Sutton Coldfield, near Birmingham, of a television relay station, the first of a series of such stations to be erected. This television station has a higher power than that at Alexandra Palace and incorporates many improvements. A new television camera developed can be used under adverse lighting conditions and is free from certain defects inherent in the older types. Arrangements were made for the manufacture of television apparatus of a new and improved design for broadcasting outside events. Considerable progress was also made with the problem of how to record television programmes. New designs for studio equipment were produced with a view to replacing a large quantity of temporary wartime apparatus and successful tests were carried out on first models. The manufacture of a number of new disc recorders designed by the Research Department, for which incidentally new premises were secured in Surrey, is in progress and work was done in establishing standards for a new type of magnetic recording.

Views on the News

By REFLECTOR

I WAS startled to read last week that Mr. R. W. Steel, chief commercial officer to the South Western Electricity Board (and former borough electrical engineer of Cheltenham) had said, according to some reports, that there was now less generating plant in the country than there was a year ago. He was also reported to have said that we had only half the number of generating sets we should have. I might have known that his statements had been truncated or garbled. What Mr. Steel endeavoured to show was that the expansion of generating capacity was failing to catch up with the growth of demand. Actually, of course, capacity is rising, but it is expected that the increase will be only about 700,000 kW this year against a " programme " figure of 1,150,000 kW.

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It is most unusual for an electricity authority to be accused of charging too much for appliances and accessories; the complaint is generally that there has been undercutting. Yet in the House of Commons just before the recess Major Legg-Bourke (Isle of Ely) alleged that the Eastern Electricity Board was charging 9s. for a push-bar lampholder which could be bought elsewhere for as little as 2s. 8d. Now he has been informed, I am told, that the Board has agreed to dispose of its remaining stock at 3s. 9d. which is said to be the average price charged by local retailers. I should have thought that the obvious thing for a consumer to do would be to go to a local retailer if he considered the Board's price too high.

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A few weeks ago I referred to the (in my opinion) excessively long sterilizing times recommended by the Ministry of Food and the Electrical Association of Women for fruit bottling. Miss A. M. Pilkington, E.A.W. housecraft lecturer, now tells me that she has recently had conversations with representatives of the Ministries of Food and Agriculture and the Good Housekeeping Institute, and all confirm that while there are many good methods of fruit bottling it is essential that when printing recipes they should be as foolproof as possible. Good Housekeeping tested fruit bottling last year by the method I adopted, and while they found that some bottles of plums kept quite well, others done at the same time and with the same batch for no apparent reason fermented quite quickly. They also found that with tightly packed bottles of fruit such as blackberries, short cooking did not sterilize the fruit in the centre of the bottle which quickly fermented. The Ministries of Food and Agriculture agree that quite a number of people have found short-cut methods perfectly satisfactory, and where that is so would not attempt to discourage people from using these methods, but for them absolutely foolproof methods are essential.

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Miss Pilkington adds:—" Long slow cooking need not cost any more from a monetary or fuel point of view, and if there is a very slight increase in current consumption I am sure the Ministry of Fuel would feel it worth while to avoid the possibility of food poisoning. The small domestic oven in many cases has a lower current consumption than a boiling plate—1,400 W as against 1,800 W on full, 350 W versus 450 W on low. Thermostats and ' Simmerstats ' would probably cut these respective current consumptions again."

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I commented some time ago on what I thought was a somewhat exaggerated claim for higher salaries made on behalf of power station superintendents. Now I read in the *Electrical Power Engineer* that at a section meeting of the E.P.E.A. it was learned with disappointment that the National Executive Council had decided to do nothing about a claim for a 100 per cent increase on the 1939 salary schedule. The fear was expressed that the proposal had been " regarded facetiously."

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Up to now Blackfriars Bridge has been lighted by gas and so I was pleased to see last week that concrete standards of a type commonly used for electric lighting were being erected on the bridge. Closer examination revealed that gas barrel had been cast into the standards. That by itself might not have meant anything but upon inquiry I found that gas still holds the field—or the bridge, so the City Corporation seems to have missed an opportunity of making the lighting really up-to-date.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE Ministry of Fuel and Power announces that consequent on the winding up of the Electricity Commission the following appointments have been made to the Electricity Division of the Ministry at Cromwell House, Dean Stanley Street, Millbank (postal address: 7, Millbank, S.W.1):—Engineering Department: Mr. **A. N. East,** chief engineering inspector; Mr. **H. W. Grimmitt,** deputy chief engineering inspector; **Mr. A. H. Linton,** engineering inspector; and **Mr. S. Howarth,** chief meter examiner. **Mr. A. E. Marson,** M.B.E., and certain other members of the former staff of the Electricity Commission have also been appointed to the Electricity Division of the Ministry.

Mr. S. I. Ellis, A.M.I.E.E., retired from the staff of the North Eastern Electricity Board on 31st August. He joined the North-Eastern Electric Supply Co., Ltd., then known as the Newcastle-upon-Tyne Electric Supply Co., Ltd., in 1901 and after passing through the drawing office he was posted to the Consumers' and Development Department. This department was later split into the Lighting and Heating Department and the Power Department in the former of which Mr. Ellis was given responsibility for the district comprising Central Newcastle, Gateshead, Jarrow, Hebburn, Felling and Blaydon. During the 1914-18 war he served in the Royal Engineers and early in 1919 returned to the North-Eastern Co., being re-posted to the Lighting and Heating Department in which he later became deputy engineer. In 1937 he was made head of the department. He was appointed chairman of the British Electrical Development Association's North Eastern Area Committee in 1939 and continued in that office for five years, being at the same time a member of the Association's Council. He was a founder-member of the North Eastern Group of the Illuminating Engineering Society, of which group he was first chairman from 1941 to 1943, when he was also a member of the Society's Council.

Mr. S. I. Ellis

Mr. S. C. Peck has resigned from the board of Sterling Electric Holdings, Ltd., and **Messrs. D. A. Braithwaite, T. Smith** and **H. Wethered-Thorn** have joined the board.

Mr. D. E. Harrison, who for some time has been technical electrical assistant at the Doncaster Plant railway works and who first entered the electrical industry in 1909 when he became a pupil at Doncaster Corporation electricity works, has been appointed to succeed **Mr. H. H. Hardy** as chief electrical assistant to the mechanical engineer, Eastern Region, British Railways. Mr. Harrison left the electricity works in 1912 to become junior electrical assistant with the L.N.E.R. at Doncaster.

Dr. A. N. Arman, PH.D., A.C.G.I., M.I.E.E., A.M.I.MECH.E., has been appointed by the Pirelli-General Cable Works, Ltd., as manager and chief engineer of its power cable factory at Eastleigh. Educated at the City and Guilds Engineering College, South Kensington, Dr. Arman served an apprenticeship with A. Reyrolle & Co., Ltd. He later joined Callender's Cable & Construction Co.'s Research and Development Department where he worked on a variety of problems connected with high-pressure gas cables and discharge in dielectrics. From 1940 to 1945 he served in H.M. Forces, three-and-a-half years being spent with the Directorate in Mechanical Engineering at the War Office. From 1945 to the date of his present appointment he was technical manager of the power cable factories of British Insulated Callender's Cables, Ltd., at Erith and Prescot.

Mr. H. Constant has been appointed Director of the National Gas Turbine Establishment of the Ministry of Supply in succession to **Dr. Roxbee Cox** who is to take up an appointment with the Ministry of Fuel and Power.

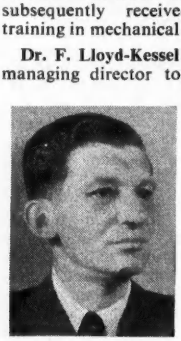
Mr. William Fraser, M.I.E.E., who has been responsible for the creation and building up of Scottish Cables, Ltd., and who has since the inception of the company acted in the joint capacity of chairman and managing director, recently felt it desirable, owing to the expanding nature of the business, especially overseas, to be relieved of much of the executive detail. Accordingly he is to take over the duties of governing chairman and his nephew, **Mr. William Fraser,** jun., B.SC., formerly assistant managing director, becomes managing director. Mr. Fraser, jun., who has assisted his uncle since

Mr. William Fraser

Mr. William Fraser, jun.

the inception of the company, received his technical education at London University and subsequently received an intensive works training in mechanical and electrical engineering.

Dr. F. Lloyd-Kessel has been appointed joint managing director to the board of H. Fisher (Oldham), Ltd., manufacturers of electrical domestic and medical appliances. He controls the G.P.U. group of engineering companies and has been connected with the electrical industry at home and abroad for many years, his main study being devoted to the question of organization.



Dr. F. Lloyd-Kessel

Mr. W. Austin, senior accounting officer of the Northamptonshire Sub-Area of the East Midlands Electricity Board, and formerly the chief accountant to the Northampton Electric Light & Power Co., Ltd., and its associated companies, has retired.

The following appointments have recently been made by the East Midland Electricity Board:—Lincolnshire Sub-Area: **Mr. A. Russell** (formerly with Kettering Corporation) has been appointed commercial officer. Northamptonshire Sub-Area: **Mr. W. Austin,** accountant, retired on 31st August and his deputy **Mr. F. H. Holder,** has been appointed Sub-Area accountant as from 1st September. Barton and District Sub-Area: **Mr. A. Hardy,** formerly mains engineer (Loughborough District) has been appointed Sub-Area engineer as from 1st September, 1948, in succession to **Mr. R. F. Markham,** who has joined the B.E.A.

Standard Telephones & Cables, Ltd. (Industrial Supplies Division) announces the appointment of **Mr. O. L. Barnes,** of 17, Park Road, Hebburn, Co. Durham (telephone: Hebburn 32024) and **Mr. L. E. E. Langdon,** of 51, Dobercroft Avenue, Beauchief, Sheffield (telephone: Sheffield 73859), as resident representatives. Mr. Barnes, who is a Faraday House gold medallist, and previously a member of the technical and research department of A. Reyrolle & Co., Ltd., will cover the territory of Northumberland and Durham, and Mr. Langdon, a corporate member of the Illuminating Engineering Society, will represent the company in South Yorkshire and Derbyshire.

The Midland area finals of the E.I.B.A. national golf championship were decided at Sandwell Park Golf Club on 26th August, in squally conditions, which made this course, always difficult for the golfer who strays from the fairway, a severe test. In view of the conditions, the winner, **Mr. S. G. Miles** (handicap 12) played very creditably to return a net 79 to win by four shots from **Mr. T. H. Varcoe** (handicap 22) who returned a net 83. The par score for the course is 75. Fewer than a dozen strokes separated the first and last score. **Mr. D. P. Sayers,** B.SC., M.I.E.E., M.I.MECH.E., chief engineer, Midlands Electricity Board, presented the Railing Cup to the winner and the Jacob Cup to the runner-up, at an informal gathering of players and spectators in the Club House during the evening.

On Monday seven employees of **G. & J. Weir, Ltd.,** Messrs. J. Murray, J. Robb, J. Pollock, A. Hamilton, R. Risk, T. Brown and W. T. Alexander, received long-service certificates and presentations from the directors on completing fifty years' unbroken service with the firm. The company now has eleven employees with fifty years' service still working, including the chairman, Viscount Weir, and the deputy-chairman, Sir John Richmond.

The No. 3 (Essex) Sub-Area of the **Eastern Electricity Board** is holding a Sports Day and Fête to-morrow at the Clesco Sports and Social Club Ground, near Dovers Corner, Rainham, Essex. The official opening will be performed by Mrs. C. T. Melling who will be accompanied by Mr. Melling, chairman of the Eastern Electricity Board, and other members of the Board.

The seventieth birthday of **Mr. Walter H. Bulpitt,** J.P., O.B.E., chairman and managing director of Bulpitt & Sons, Ltd., Birmingham, was celebrated at a dinner and concert given by his co-directors, including his two sons, at the Botanical Gardens, Edgbaston, Birmingham,

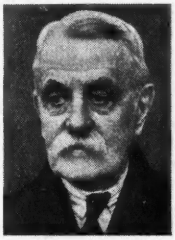
Mr. W. H. Bulpitt receiving a silver rose bowl from Mr. F. B. Baker

on 27th August. Mr. Bulpitt, who has been with the company, started by his grandfather in 1870, for fifty-five years, was presented by Mr. F. B. Baker with an inscribed silver rose bowl subscribed for by employees, whilst Mrs. Bulpitt received a bouquet from Miss Theresa Rogers, aged eighty, who is retiring after sixty years' service with Bulpitt's. Also present were 220 employees, all with over fifteen years' service. Mr. William S. Bulpitt presided, and

the principal toast, " Our Guest," was proposed by Mr. F. H. Viney.

Mr. **H. V. Potter,** B.SC., F.R.I.C., M.I.CHEM.E., has been elected chairman of Bakelite, Ltd., in succession to **Sir James Swinburne,** BT., F.R.S., who has decided that the time has come for the

Mr. H. V. Potter



Sir James Swinburne, Bt.

primary control of the company's affairs to pass into the hands of a younger man. Sir James will remain a director of the company. Mr. Potter, who has been managing director of the company for twenty years, will continue in that position, combining these responsibilities with those of chairman. It is more than thirty years since Mr. Potter joined the Damard Lacquer Co., the predecessor of Bakelite, Ltd. He started as a research chemist and in a few years became manager, later a director, and subsequently the chief executive officer of the company.

Obituary

Mr. Charles Richard Bolton, A.M.I.E.E., who died at Liverpool on 28th August aged fifty-seven, was on the staff of the works manager's department, British Insulated Callender's Cables, Ltd., Prescot. He was a graduate of Liverpool University and took the degree of Master of Engineering with first class honours. He had been in the service of B.I.C. for many years and much valuable experimental work on the detection of stationary submarines was entrusted to him during the war when he was seconded to the Lancashire Anti-Submarine Committee.

Mr. Robert McLeod, general manager of the Edinburgh Tramways Department since 1935, died on 3rd September at the age of sixty-two. Mr. McLeod was traffic superintendent for nine years during which the whole of the cable tramways were converted to electric traction.

Mr. W. G. Newberry.—The death occurred on 4th September at the age of sixty-six, of Mr. William George Newberry, M.I.E.E. group secretary with the British Electrical and Allied Manufacturers' Association, and in charge of the commercial side of the Association, specializing in switchgear and instruments. Mr. Newberry was born at Kimberley, South Africa, and was educated at the Grammar School, Huntingdon, and at New College, Eastbourne. After a four-years' apprenticeship with E. R. & F. Turner, Ltd., Ipswich, he joined Johnson & Phillips, Ltd. in 1903 as a draughtsman, and in 1910 was appointed estimator with Ferranti, Ltd., later becoming manager of the company's London office. Whilst with that company he toured South America. He joined B.E.A.M.A. as group secretary in 1927.

Mr. F. W. Hallam.—The death occurred on 30th August of Mr. Frederick William Hallam, chief plant engineer of the British Thomson-Houston works at Lower Ford Street, Coventry. He was fifty-seven.

Mr. Herbert Arthur Spreadbury, chairman and managing director of the Z Electric Lamps & Supplies Co., Ltd., died on 3rd September.

WILLS.—Lord Lytton.—A further grant of probate, in respect of settled property valued at £22,500, has been issued in the estate of Lord Lytton, chairman of Central London Electricity Ltd., and London Associated Electricity Undertakings, Ltd., who left unsettled property already valued at £77,947.

B.E.A.–B.E.A.M.A. Joint Committee

A JOINT committee of representatives of the British Electricity Authority and the British Electrical and Allied Manufacturers' Association has been established. The B.E.A. representatives are: Mr. J. Hacking (deputy chairman), Lt. Col. E. H. E. Woodward (member), Mr. V. A. Pask (chief engineer), Mr. E. R. Wilkinson (commercial manager), Mr. W. C. Parker (controller, S.E. Division), Mr. H. V. Pugh (controller, S. Wales Division), Mr. E. A. Mills (deputy chairman, London Board), Mr. W. R. T. Skinner (deputy chairman, S.E. Board), Mr. H. Willott Taylor (chief engineer, Southern Board), Mr. R. A. S. Thwaites (deputy chairman, N.W. Board), Mr. H. F. Carpenter (secretary, B.E.A.). The B.E.A.M.A. representatives are: Sir George Nelson (chairman of Council), Mr. E. C. Holroyde (vice-chairman), Mr. R. Berry, Mr. I. R. Cox, Sir Claude Gibb, Sir Harry Railing, and Mr. J. S. Ramsden (members of Council), Mr. B. H. Leeson (director), Mr. D. M. Buist (export director), Mr. Felix A. Rogers (controller, Consumers' Goods Division), and the Hon. J. R. Rea (secretary).

Extensions at Willesden

THE B.E.A. has applied to the Minister of Fuel and Power for consent to extend the Willesden (Acton Lane) power station by the installation of a 30,000-kW turbo-alternator, two 240,000-lb-per-hr boilers, a reinforced concrete cooling tower (2,250,000 gal. per hr) and the necessary buildings and civil engineering works. It is notified that any objections by owners or lessees of property within 300 yd of the site should be made to the Secretary, Ministry of Fuel and Power (Electricity Division), Cromwell House, Millbank, S.W.1 before 10th October next.

Electrical Manufacturing in India

DR. MOOKERJI, Minister of Industry and Commerce, told the Indian Parliament last week that the Government of India was considering the possibility of establishing a factory for the manufacture of heavy electrical plant in India. For this purpose preliminary discussions were now taking place with certain foreign manufacturers.

Dr. Mookerji declined to disclose the terms on which these discussions were being held, but said he had had estimates from the English Electric Co., Ltd., the General Electric Co., Ltd., and the Westinghouse Electric & Manufacturing Co. The Government expected to receive an offer also from a well-known Swiss company. Representatives of these concerns were already in New Delhi, fully armed with powers to settle with the Government.

The Government of India was also examining proposals for the development of iron and steel, machine tools, shipbuilding, penicillin and sulpha drugs, telephone cables and high-voltage insulators, automatic telephone and carrier equipment and synthetic petrol industries. A Government factory for the manufacture of telephone and carrier equipment was expected to be established before April, 1949, but as regarded the other industries, Dr. Mookerji was not in a position at present to indicate which of them would be started in the course of the next year.

The Minister of Communications, replying to questions regarding a recently-concluded agreement between the Indian Government and Automatic Telephone & Electric Co., Ltd., for telephone apparatus and allied materials, said that the financial commitment in respect of the agreement would be about £600,000 in the course of the first fifteen years.

Anglo-Belgian Telephone Cable

THE submarine telephone cable that was laid between England and Holland in November, 1947 (*Electrical Review*, 19th December, 1947) represented an advance in under-sea cable engineering. On 2nd September the laying was completed of a second similar cable between St. Margaret's Bay, England, and La Panne, Belgium. The manufacture of this cable was commenced in the Greenwich (Telcon) works of Submarine Cables, Ltd., on 1st March this year and a length of 52 nautical miles was completed at the end of July. As the result of experience gained, slight modifications have been made in the design and manufacturing control of this type of co-axial cable which have resulted in slight improvements of electrical characteristics and, particularly, impedance uniformity.

The length of the cable laid is approximately 50 nautical miles and the completed system will be capable of providing about 240 telephone circuits. Comparison with the first Anglo-Belgian cable of 1911 is interesting in that the latter, containing four coil-loaded conductors, provided only three telephone circuits. This is a very illuminating indication of the advances made by Submarine Cables, Ltd., in the design and manufacture of submarine telephone cables and also of equivalent advances and improvements in the associated end-amplifiers and equipment.

In this instance the Post Office ship H.M.T.S. *Alert* has carried out the laying operations. Two voyages were involved, one to lay the shore ends and part of the main cable and the other for completion.

Plug and Socket Manufacture

THE new factory at Salterbeck, near Workington, Cumberland, in which DS Plugs, Ltd., commenced early this year manufacturing plugs and socket outlets which were formerly made at the Manchester factory of Dorman & Smith, Ltd., was officially opened on Monday last. The ceremony was performed by Dame Caroline Haslett, who unlocked the main entrance doors and unveiled a tablet in the hall. A tour of the factory followed, prior to luncheon which was served in the works canteen. Mr. C. M. Nisbett, director, in his capacity as M.C., called upon Mr. T. Atherton, chairman of the company, who explained that of the three areas officially favoured Cumberland was the nearest to the factory in which they had been manufacturing for the past seventy years.

Dame Caroline Haslett congratulated the West Cumberland Development Board on the results of its efforts to attract work for local people. She remarked that the DS firm was an old one with a new conception of how and where skilled work should be done in cleaner and happier surroundings.

Mr. Eric Atherton, the youngest shareholder, then presented Dame Caroline with a memento of the occasion. Mr. R. Amberton, London director, in thanking Dame Caroline, remarked that in spite of her numerous activities she was always ready to advise on what the housewife needed. Mr. Bruce L. Cooper, local director, proposed the toast of the guests. Alderman J. J. Adams, of the West Cumberland Development Council and deputy regional controller, Board of Trade, responding, explained that those industries which were encouraged to go into the area were carefully selected with the object of providing permanent employment. The Mayor of Workington, Alderman A. Rowe, promised the assistance of the local authority.

A second factory, which has been completed alongside but not yet equipped, has recently been taken over by DS Plugs, Ltd., to augment the plant which is already in production.

Electric Power Transmission

INVESTIGATIONS IN SWITZERLAND

DURING a recent visit to Switzerland we had an opportunity of discussing with Dr. W. Wanger the implications in practice of the principles enunciated in his lecture to the I.E.E. Transmission Section last April. This lecture, on the "Technical and Economic Aspects of the Transmission of Electrical Energy over Long Distances", dealt first with the limit set by system stability to the amount of power that can be transmitted at a given voltage.

Transmittable power may be expressed as $P = \frac{EV \sin \phi}{X}$, where X represents the total reactance and sin ϕ the displacement angle between voltages E and V at the sending and receiving ends of a system. Its maximum theoretical value, P max, is reached at 90 deg (Fig. 1), above which the generator falls out of step. Under working conditions a margin is required to allow for transient conditions due to sudden load changes or faults. In Dr. Wanger's lecture $\frac{2}{3}$ P max was provisionally taken as the practical upper limit, but he informed us that he regards the value of $\frac{1}{2}$ P max taken by J. S. Forrest in *Overhead Line Charts** as a sound assumption in its application to a large interconnected system, in view of such factors as varying characteristics of generators and clearance times of protective equipment.

The displacement angle along an overhead line can be deduced from the unidirectional surge impedance load. Since an electromagnetic wave travels at about the velocity of light (300,000 km per sec), the displacement angle is $\frac{f l \, 360 \text{ deg}}{300{,}000}$, where f is the frequency and l is the length of the line in km. For 50 cycles and 400 km (250 miles) the angle of 24 deg gives a maximum figure for point-to-point transmission in an overhead line. As at $\frac{2}{3}$ P max the total permissible angle is 42 deg, this leaves 18 deg for generators and transformers.

An overhead line consists of distributed series reactances and shunt capacitances, which could be compensated for by the insertion of shunt reactances and series capacitances to an extent necessary to reduce the effective length of line to 400 km. While shunt reactors have been adopted extensively, series capacitors have not so far been employed for long-distance transmission on account of the cost of designing them to withstand short-circuit currents; also the problem of protecting them from damage in the case of parallel circuits has not yet been solved. The adoption of other methods of improving steady-state as well as transient stability, e.g., generator-field control, synchronous condensers, asynchronous generators and sectional switching, are discussed

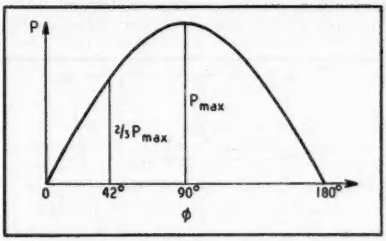


Fig. 1

in the lecture, which is reproduced in the *I.E.E. Journal*, Part 1, for August.

Very short fault-clearance times are essential, and quick-acting relays and high-speed circuit-breakers may be all that is necessary in a closely interconnected system. Breakers are available with total rupturing times of 0·05 sec. If, however, a remote power station is connected by only one or two lines with a distribution network, high-speed reclosure may also be needed and is feasible for coping with arcing short circuits at high voltages, since the deionizing time is only 0·2 to 0·3 sec. Stability can be further improved if only one phase is opened on a single-phase fault. The most promising protective scheme appears to be a combination of distance and carrier relays.

For a given voltage and area of conductor, the amount of power that can be transmitted may be stated in MVA miles. For the British 132-kV grid the static stability limit is probably about 16,000 MVA miles, giving 8,000 MVA miles as the working maximum. In Switzerland conditions differ mainly in that hydro-electric stations (which are mostly in the southern part of the country) are usually distant from the load centres in the

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north, and the running of point-to-point transmission lines over the Alps presents considerable engineering difficulties. Consequently the number of circuits must be kept to a minimum.

The highest voltage now in use there is 150 kV, but towers are already being constructed mechanically for 400 kV, since the intermediate Continental standard of 220 kV will be skipped as inadequate for future developments. These include the possible doubling of the present generating capacity of 2½ million kW (with an output of some 10,000 million kWh) by the construction of stations in the south-eastern area. A far easier route is that along the valley in which the Rhône has its source and travels west. This holds out the promise of further interconnection with French projects such as the

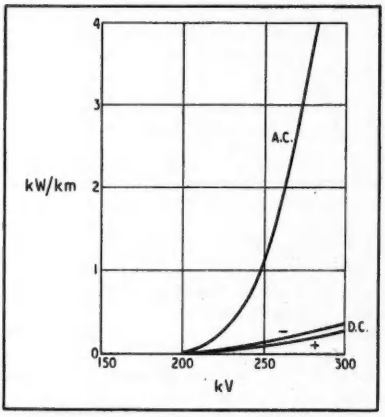


Fig. 2

Génissiat Dam, and ultimately of forming a link in a Continental very-high-voltage network.

We had an opportunity of inspecting the short length of line erected for 400-kV experiments at the Brown-Boveri works, in which corona effects figure largely. The influence of the weather is most marked; while appreciable losses do not begin until about 400 kV in fair weather, they are found to occur sometimes at half that value in rain. The large conductor diameters required on account of corona at voltages above about 220 kV (e.g., 50 mm for 400 kV) entail the adoption of hollow conductors or of two to four comparatively small conductors. Further investigations will be necessary, Dr. Wanger considers, before the relative merits of the two methods can be assessed. Corona losses militate against the use of arc-suppression coils at high voltages, one of their disadvantages being the prevention of the use of graded insulation for transformers. Solid earthing of the neutral, which permits a lower insulation level and thus facilitates the design of switchgear and transformers, will in his view be ultimately adopted for large high-voltage systems; its main drawback—line interruption with single-phase arcing earth faults—can largely be obviated by high-speed reclosure.

For lines and station equipment above 220 kV little further reinforcement of insulation would, he believes, be necessary to guard against lightning surges, so that only the lower level required to take care of switching and earth-fault surges would need to be raised. Insulation need not therefore be proportional to the increase in voltage above 220 kV, provided the system neutral is solidly earthed.

All long-distance transmission schemes now contemplated are based upon the use of a.c. Despite inherent advantages of d.c., among which are the low corona losses compared with a.c. as shown in Fig. 2, its technique is in too early a stage of development, particularly in regard to terminal conversion apparatus and switchgear, for its adoption to become practicable in the near future. Nevertheless the d.c. research station we saw at Baden has provided information of value, which is detailed in the lecture.

Australian Import Trade

DURING the nine months ended March last Australian imports of electrical appliances and equipment amounted to £A6,837,000 in value, compared with £A3,973,000 in the corresponding period of 1946-47. The principal items are compared below:—

Class	9 mos. ended March	
	1947 £A(000)	1948 £A(000)
	f.o.b.	f.o.b.
Batteries and accumulators ..	153	55
Cable and wire, covered ..	443	950
Dynamo-electric machines ..	732	1,510
Lamps, filament	143	293
Telegraph and telephone instruments, etc.	935	943
Electrical machinery and appliances, unspecified	1,567	3,086

During the same period Australian exports of electrical appliances and equipment were valued f.o.b. at £A841,000 against £A621,000.

Correspondence

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Impregnation Plant

REFERRING to Mr. Barlow's letter in your issue of 27th August, I would like to make it quite clear that I did not, of course, at any time, suggest that good results could not be obtained by vacuum impregnation—I know they can.

The points on which I join issue are contained in the first two sentences of the original article, where a general reference is made to "the importance of thoroughly impregnating the insulation of armatures, coils, transformers," etc. (no special types of armatures, coils, or transformers are mentioned), and that "dipping methods—are frequently little more than a surface treatment" and that such methods "cannot ensure the removal of all traces of moisture and the complete penetration of insulating medium."

My comments covered these two points only as a general statement, and were made as a result of many years' experience in the matter of impregnation by all methods, i.e. vacuum, hot and cold dipping, conveyor impregnation, etc., and I can only repeat it is my experience that by using suitable materials results equal in every way to those obtained by vacuum impregnation can be obtained by non-vacuum methods.

Mr. Barlow states that many firms are installing vacuum plants, but the reverse is also true—firms who have for many years been using vacuum impregnation are going over to non-vacuum processes, and I cannot visualize this being done if it would make their products any less reputable and reliable.

In conclusion, I would mention that I have no interest whatever in any type of impregnating plant as such—vacuum or otherwise—but am merely concerned with the results obtained.

Brighton. L.E.S.

Fruit Bottling Methods

IN connection with the reference made to fruit bottling in "Views on the News" (*Electrical Review*, 6th August), I would like to say that while it is acknowledged that there are various methods by which fruit can be bottled, it is considered advisable to recommend those which are known to be safe and reliable.

The method referred to has obviously worked in most cases, although, by bringing the water in the sterilizer to boiling point, there would be a possibility of the fruit rising in the jars, and, in inexperienced hands, a grave danger of the jars bursting.

*Whitehall, S.W.*1. MARJORIE D. HUXLEY (Ministry of Food).

Domestic Demand

MR. R. W. MINTER emphasizes in your issue of 3rd September that the "all-electric" householder has a strong claim on the services of the electricity supplier, and that nobody will deny. I would, however, ask Mr. Minter to be practical and recognize that the suggestions contained in my abbreviated article are related to a problem which is already with us, not merely to some hypothetical future case.

My industrial friends are no more enamoured with low frequency than my household is with low voltage. It is clearly apparent that the British Electricity Authority is intending to make the domestic section of electricity supply stand on its own feet so far as price is concerned, and I for one will not be with Mr. Minter when he proposes that no curb shall be placed on the five million consumers who, according to the Clow Committee Report, produce annual revenues of less than £4 each but who, without prior notice, can switch on a substantial space-heating load at the time of the annual peak.

I object to mass treatment of individuals and it seems that my critic has a similar nature. He may, therefore, after closer study, see in my suggestions for restriction and regulation an endeavour to share out the available resources, giving fair portions to established consumers and also to the new consumers, which include the younger people setting up house for the first time.

I would like to see those who are prepared to regulate their demands receive some compensation by way of price, but I would not want those who are prepared to pay for luxury to be denied the pleasure of making unrestricted demands upon the electricity supply authority at times when such a practice does not affect industry or the economics of general supply.

The Clow Committee seems to have great faith in vigorous publicity, better known as

" intensive propaganda," a somewhat expensive instrument of mass control, an instrument which in the opposite sense Mr. Minter would seek to employ. In between these two opposites is a practical method which those in the industry are seeking to find, guided in their search not entirely by considerations of personal gain or love of power to inflict restrictions on the freedom of others, as perhaps Mr. Minter intends to convey.

Whitchurch, Cardiff. G. H. BOWDEN, M.I.E.E.

Domestic Installations

YOUR leader makes timely reference to the most serious defects of domestic installations—inadequate protection against leakage and overload. Were annual figures concerning losses from fires caused by persistent earth leakage available I feel certain that immediate concentration upon adequate protection would arise, as has been the case on the industrial side.

Even when leakage protection is applied, it is so often wrongly installed. It should not be necessary for all clocks to be stopped, all lights extinguished and other inconveniences suffered by reason of, say, an earth fault on a cooker element, but this is what happens when a leakage protective device is used as a sort of mains switch for the whole installation. This idea is, unfortunately, perpetuated in the E.D.A. specification for consumers' control units, where the mains switch is interchangeable for an earth-leakage circuit-breaker covering the whole installation without discrimination.

After many years spent on the installation side of the electrical industry I am forced to the conclusion that the real answer to the leakage problem in domestic installations is reinforced insulation. We already have all-insulated accessories, meters, consumers' control units, vacuum cleaners and smaller appliances, and it is no longer necessary to rely upon metalclad wiring systems with the more than adequate non-metallic systems now available. The more extensive use of all these will go far to solve the domestic leakage problem and the ring main circuit will help in overload protection, again by sub-division.

It will probably be many years before we achieve the all-insulated cooker, with non-metallic hot-plates, and present-day cookers need leakage protection. This should be applied at the control unit, however, and suitable equipment is available. In the case of wash-boilers, washing machines, etc., the leakage protective device should be located at the socket outlet feeding the equipment and by this means the vulnerable part of the system, the earth wire, is kept short by connection to the nearest water pipe and is in full view throughout its length. In addition, the consumer is easily persuaded to use the test key of the voltage-operated device as the normal means of switching off the equipment, so that the test is automatic and the mechanism is kept in working order, ready for any call upon it.

I prefer the voltage-operated as against the current-operated device for several reasons. One is that the current-operated device is comparatively expensive, and usually only one per installation can be contemplated. The earth continuity circuit must therefore be in good condition, but with the present standard of installation work there is no assurance of adequate continuity. Conduits are not generally tested when first installed, and even if they are, are allowed to deteriorate to the point of discontinuity with all that it entails. The current-operated device cannot be so easily tested from the point where the equipment is operated and, finally, surely what we need to guard the consumer against is leakage *voltage*.

The greatest risk appears to me to lie in the fact that with current-operated protection, including fuses, necessarily relying upon leakage currents for operation, with the usual exposed earth continuity circuits, there is always the serious menace of the extension of these currents on to gas pipes and extraneous metal of all kinds. A great advance upon present practice would be the introduction of insulated protective circuits, and as these are inherent with insulated wiring systems surely here is our first step towards greater safety.

Folkestone. T. C. GILBERT, M.I.E.E.

Electrical Training

THE article by W. Le Page on this subject in the *Electrical Review* of 27th August, biased as it is to the contracting side of the industry, applies equally well to other sections and trades. If, as the writer would have us believe, the standard of education of youths entering the industry is low, then much time and still more money have been, and still are, being wasted on education.

His remarks regarding the interviewing of men of from 24 to 30 years of age are far

from encouraging, for they at least should have been able to answer what appears a reasonable question. Their failure to do so may be partly due to war service, but I rather suspect it is due to a complete lack of interest in anything outside routine tasks.

The really skilled men, now in the 40-50 years group, have moved around and seen things; many have more than an elementary knowledge of the technical side, but lack a recognized qualification. Even so it is they who have the more complicated jobs to do at the same rates of pay as their less skilled fellows.

A trade test, coupled with a few reasonable technical questions, would do much to improve matters, especially if remuneration advanced accordingly. This test might well be applied to some of the many "electrical engineers" found at every street corner.

"TYKE."

Arms and the Boards

I SHOULD be obliged if you, or possibly the Public Relations Officer of the B.E.A., could explain the value of armorial bearings for Electricity Boards and their effect on, say, rising prices and falling voltages.

Doubtless consideration has been given to the introduction of a Board tie—red, yellow and blue sine waves on a black background.

Robertsbridge, Sussex. T. J. BARFIELD.

Writing a Technical Paper

WITH reference to the excellent article on this subject which appeared in your issue of 3rd September, I would draw your readers' attention to the standard "Printers' and Authors' Proof Corrections" which is issued by the B.S.I. as B.S. 1219/1945, price 2s. 6d.

Trafford Park. LAURENCE H. A. CARR.

Load Limitation

Winter Plans for London and South East

THE new electricity load restrictions for the coming winter for the London and South Eastern Region were announced on Monday by Sir Frederick Leggett, chairman of the Regional Board for industry. He said that they applied both to industry and to commercial undertakings, and for the first time, commercial firms would be liable to legal proceedings.

The maximum loads which must not be exceeded in industrial undertakings would be as follows:—October, 90 per cent of the 1946-47 peak load between 4 p.m. and 6 p.m.; November, 90 per cent between 8 a.m. and noon and between 4 p.m. and 6 p.m.; December-February, 80 per cent between 7 a.m. and 7 p.m. (the periods 8 a.m.-noon and 4 p.m.-6 p.m. being the most serious). Commerce: Minimum load 50 per cent of installed capacity at present date within the hours as specified for industry. It was felt that the proposed industrial arrangement would enable some firms to avoid special night shifts. Workmen's tickets would be issued outside the usual hours where necessary. Steps had been taken to ensure that the changes could begin on 1st October, but conferences of representatives of those concerned would be held locally before that date. It might not be possible to avoid load-shedding entirely, but every effort would be made to enable industry to carry on without interruption.

Electricity undertakings would supply information on which working committees would fix targets for individual firms. There would be no automatic exemptions.

Mr. J. N. Waite, controller of the London Division of the British Electricity Authority, said that new generating plant represented an increase of 400,000 to 500,000 kW for next winter, but the increased load was about the same. A really cold winter would force arbitrary reductions, but with mild weather we should get through without trouble. He expected that the net increase in generating capacity would be 6,800,000 kW by 1952, which would just balance the load.

Mr. E. J. Taylor, chairman of the Electricity Committee of the Regional Board, said that most commercial firms would be able to attain their target by adjustments during normal hours. If a shop was unable to do so, it would be expected to close during its normal hours and open at some other time. Cinemas and theatres should be able to attain their targets during normal hours.

Copenhagen Exhibition

FOR the assistance of visitors to the British Exhibition, Copenhagen (18th September to 3rd October) a Trade Information Centre will be available on the first floor of the Nimb Restaurant. Operating under the joint auspices of the British Import Union, the British Export Trade Research Organization, the Federation of British Industries and the Danish Merchant Guilds Association, the Centre will handle inquiries from exhibitors and visiting British exporters and manufacturers in respect of general marketing conditions for British goods in Denmark, Sweden, Norway and Finland.

The Radio Industry Council of Great Britain is arranging a demonstration of British television in association with the Danish State Radio at the Copenhagen Exhibition. Pye Radio will provide cameras and transmitting gear similar to that supplied to the B.B.C. Receivers by a number of well-known British makers will be showing the programmes in the Nimb Restaurant where the public will be able to judge results.

COMMERCE and INDUSTRY

Longer Fluorescent Lamps.

WITH a view to meeting situations, especially in shops and offices, where greater lengths of fluorescent lamps are required, members of the Electric Lamp Manufacturers' Association will be marketing on 1st January next two new 8 ft fluorescent lamps, type MCF/U, in natural colour, 1 in. and 1½ in. in diameter.

Payment During Illness

Agreement has not been reached by the National Joint Board for the Electricity Supply Industry regarding payment of salaries during illness but a majority decision is to be acted upon as an interim measure. By this, while the full salary is being paid the amount of sickness or injury benefit received by the employee is to be deducted. During the half-pay period only the amount by which salary and benefit exceed the full salary will be deducted. Sickness benefit paid during the 26 weeks commencing 5th July to those who were voluntarily insured before that date will not be deducted.

Engineering Wages

Last week the Court of Inquiry appointed by the Minister of Labour to consider the claim of the engineering trade unions for higher wages issued its report. The claim, affecting about two million workers, was for an average increase of about 13s. a week in minimum rates.

The Court expresses the view that any increase would not be incompatible with the Government's appeal for stabilization of wages as the claim was made in April, before the appearance of the White Paper on the subject. It therefore recommends an all-round increase in the national bonus for male adult workers of 5s. a week and a levelling up of the lowest district minimum rates, with adjustments for youths and boys.

Report on Wages Claim.

The unions had also asked for the consolidation of the bonus with the basic rates but the Court is not in favour of this. The report refers to the emphasis placed by both parties on the need for increased production and higher individual output to which the Court subscribes.

It is estimated that the total cost of the increase, if it is accepted by both parties, will be over £20 million a year.

Wolverhampton Export Convention

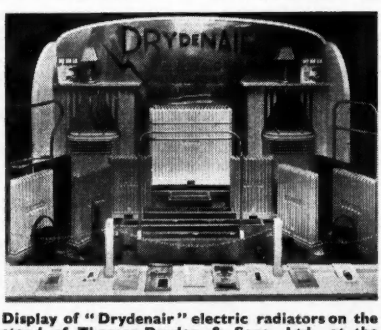
An export convention is being organized by Wolverhampton Publicity Club to take place at the Star and Garter Royal Hotel, Wolverhampton, on 24th September. The project is being supported by the Board of Trade and Mr. Barry Kay, Midland Regional Controller, will read a paper at the morning session on the co-operation that exporters can obtain from the Board of Trade in their search for new markets. A luncheon will be given by the British Export Trade Research Organization after which Colonel Disney, chairman, will explain the value of market research to exporters. The afternoon session will be conducted by B.E.T.R.O. and will include speakers who have just returned from a tour of foreign markets. In the evening Mr. W. H. Emmett will give an address on "Export Advertising and Packaging."

Electricity Output

The output from solid-fuel fired generating stations in the week ended 27th August was 711·0 million kWh, as compared with 710·7 million kWh in the preceding week and 613·5 million in the week ended 29th August, 1947. Stocks of coal at power stations at 28th August amounted to 4,078,500 tons.

Australian Telephone Factory

A report from *Reuter's Trade Services* gives further details of the proposed new Australian telephone factory. It is being erected at Ryde Park, near Sydney, by Telephone & Electrical Industries, Pty., Ltd., which is owned to the extent of 94 per cent by four British companies, Automatic Telephone & Electric Co., Ltd., Ericsson Telephones, Ltd., General Electric Co., Ltd., and Siemens Brothers & Co., Ltd. The remainder is owned by the Automatic Electric Co., of Chicago. The company will be solely occupied in the manufacture of automatic telephone exchange equipment. Practically all of it will be to the order of the Postmaster-General. The company hopes that its output will permit the addition of 20,000 new automatic telephone subscribers annually. It

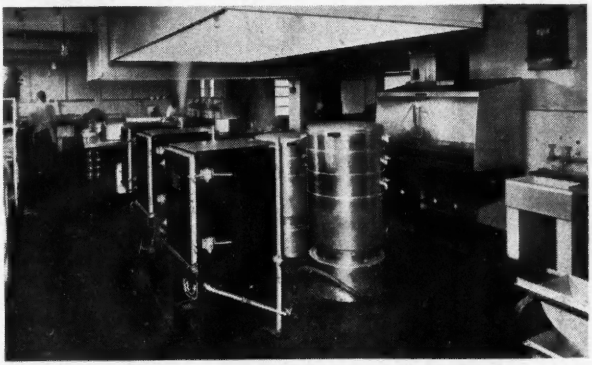


Display of "Drydenair" electric radiators on the stand of Thomas Dryden & Sons, Ltd., at the recent Blackpool and Fylde Agricultural Show

has already spent £500,000 on the project, and the modern factory is nearing completion. When in full production, it will employ more than 1,000 operators, and will replace the company's present factories at Redfern, Kogarah and Camperdown.

Airport Catering Equipment

A kitchen has recently been electrically equipped throughout by the General Electric Co., Ltd., at Northolt Airport, and has been arranged to provide an efficient service to the passenger restaurant, the staff rooms and the aircraft servery. In order to co-ordinate all installation work, the G.E.C. was commissioned to supervise the whole contract in accordance with a kitchen plan prepared by Mr. D. Gibbons, catering manager to British European Airways. The working plan provided by the G.E.C. not only enabled all plumbing, wiring and piping to be completed during the course of building construction but also allowed for the equipment to be installed and connected up within twenty-four hours of the floor being dry enough to take the weight of the equipment. The main apparatus supplied comprised a six-oven range, an open bath bain marie, three steaming ovens, three newly designed aluminium, immersion-heated, dual-purpose boilers for direct and jacket boiling and a two-pan fish fryer. Other equipment included a double-oven range, two 16-gallon stock pots, a pastry baking oven, a cabinet roasting oven and two 2-tier griller toasters. The total loading involved is approximately 265 kW. To complete the installation, Gardiner & Gulland, Ltd., provided the 26-ft passenger restaurant service-counter. This is constructed of Birmabright steel and carries a café set manufactured by J. Stott & Co. A similarly constructed 17-ft service counter has also been provided for the staff canteen.



G.E.C. catering equipment at Northolt Airport

Salesmanship Examination

The Council of the Incorporated Sales Managers' Association announces that it has reached agreement with the Executive Council of the United Commercial Travellers' Association of Great Britain and Ireland (UKCTA) Inc. concerning the future of the examination in salesmanship. I.S.M.A. will conduct an examination in May or June, 1949, and will issue its present certificate to all successful candidates. Thereafter, the United Commercial Travellers' Association will undertake responsibility for the examination, and is planning a revised syllabus, on which the first examination will probably be held in 1950. This announcement does not refer to the examination in sales management, which will continue to be conducted by I.S.M.A. One of the subjects in this examination will continue to be " Principles and Practice of Salesmanship."

Race Track Lighting

For the lighting of the King's Heath Race Track, Birmingham, " Mazdalux " reflectors housing 750-W " Mazda " gas-filled lamps, are mounted on columns of " Adastra " design at a height of 15 ft and spaced 20 ft apart round the track. The intensity of illumination is extremely even (special attention being given to starting points and bends) and is in the region of 14 lumens per sq ft. The installation was carried out by the British Thomson-Houston Co., Ltd., in conjunction with Durrant & Willetts, Ltd.

Scientific Film Festival

In October an International Festival of Scientific Films is being held in London. Many countries are sending films and fifteen of them have already accepted invitations to send delegates to the Second Annual Congress of the International Scientific Film Association being held concurrently with the Festival. After an official reception of the delegates on 4th October, the first meeting of the Assembly of the International Scientific Film Association will be held on 5th October. It is expected that sub-committees will be set up to discuss reports prepared during the past year on such subjects as customs regulations affecting the diffusion of scientific films throughout the world, the establishment of an international catalogue and library of films and the production of scientific films by international co-operation. At meetings on 6th and 7th October, business relating to the Association's work in the future will be

transacted and a final plenary session will take place on 11th October. The International Festival of Scientific Films will be held on 8th, 9th and 10th October. There will be two sessions daily, and application for tickets should be made to the Scientific Film Association, 34, Soho Square, London, W.1.

Indian Refrigeration Conference

At a Refrigeration Development Conference held in New Delhi recently, attended by representatives of the trade, growers and Provincial and State Governments, it was agreed that the development of the industry should be left to private enterprise as far as possible and that a Central Refrigeration Research Institute should be established. A committee was appointed to advise the Government on all problems connected with the industry.

The Pilgrim electric launch equipped with a 96-cell steel alkaline battery

Employment in June

We reproduce in the accompanying table figures published in the August *Ministry of Labour Gazette* which show that at the end of the second quarter of 1948 496,100 insured persons were employed in electrical engineering, wiring and contracting, and the manufacture of electrical apparatus, cables, lamps, etc. This compares with 488,400 at mid-1947 and 371,500 in the middle of 1939.

At 12th July the number of persons unemployed in the electrical machinery group in Great Britain was 1,431 (389 women); in electric wires and cables the total was 703 (243 women); telegraph and telephone apparatus, 328 (128 women); wireless apparatus (except valves) and gramophones, 1,588 (790 women); wireless valves and electric lamps, 349 (146 women); batteries and accumulators 351 (176 women); and other electrical goods, 2,239 (1,178 women).

Electric Launch

Low running costs, freedom from petrol worries and absence of vibration are important features of *The Pilgrim*, a new passenger-carrying electric launch supplied by John Morris (Gosport), Ltd., for Captain C. Hirst, M.C., owner of Leroys (Boat Builders), Guildford. The launch, which cost about £4,000, weighs 5 tons and is 30 ft long and 8 ft 6 in. wide. It carries twenty passengers and a crew of two. Driven by a "Nife" 96-cell steel - alkaline battery stored under the locker seats, the launch has single-lever control with two forward and two reverse speeds of 2½ and 4 m.p.h. When travelling at 2½ m.p.h. the motor uses 18 A and at 4 m.p.h. 32 A. The batteries, with a capacity of 250 Ah at the 5/10 hour rate, give 14 hours running at the power speed before recharging. Charging is carried out at night during the off-load period when cheap rates for electric current are obtained.

A Crompton Parkinson series wound electric motor is used developing 3½ b.h.p. at 2,000 r.p.m., 110 V d.c., continuously rated with shunt limiting winding and series winding to give two speeds, one 25 per cent less than the other. Although it was originally intended to employ reduction gearing between the motor and tailshaft, direct drive was finally decided upon so as to have as little noise as possible on the quiet river Wey. The direct drive is to a three-bladed 8 in. by 6 in. propeller on a 1½-in. bronze shaft.

T.U.C. Meeting

In her address as president of the Trades Union Congress meeting at Margate this week, Miss Florence Hancock emphasized that advocates of harder work should realize that actual average hours of work in this country

EMPLOYMENT DURING JUNE (THOUSANDS)

Branch	Males (14-65)			Females (14-60)			Total		
	Mid 1939	Mid 1947	June 1948	Mid 1939	Mid 1947	June 1948	Mid 1939	Mid 1947	June 1948
Electrical engineering ..	105·9	105·3	111·6	28·0	49·0	49·9	133·9	154·3	161·5
Wiring and contracting ..	38·9	52·2	57·1	2·8	5·7	5·7	41·7	57·9	62·8
Electrical apparatus, cables, lamps, etc.	116.4	143·0	147·6	79·5	133·2	124·2	195·9	276·2	271·8

were 45 a week for all workers, including women, young persons and elderly employees. There was no scientific basis for the "old fashioned" view that to obtain increased output it was necessary to lengthen hours.

Miss Hancock deprecated unofficial stoppages of work and "active mischief makers" who aimed at undermining the trade union movement. She said that trade unionists had to recognize their responsibilities and it was the duty of individual workers to resist every attempt to sabotage the efforts which their responsible leaders were making to secure a proper settlement of trade union claims.

The General Council in a supplementary report on the economic situation contended that it would find it difficult to restrain demands for higher wages if prices continued to rise and asked the Government to take more vigorous steps to secure price reductions. It recognized that while profits remained at a high level the vast majority of companies were not paying higher dividends.

Scottish Hydro-Electric Contracts

The North of Scotland Hydro-Electric Board announces that the main contract for its Glen Shira project (Constructional Scheme No. 12) has been awarded to A. M. Carmichael, Ltd., Edinburgh. The civil engineering consultants are Babtie, Shaw & Morton, Glasgow. The generating plant will be made at Scotstoun, Glasgow, by Harland & Wolff for the English Electric Co.

The Glen Shira project together with the recently published Allt-na-Lairige project (contracts for which have not yet been placed), will produce about 100 million kWh annually by harnessing the Rivers Shira and Fyne.

Trade Announcements

The **Hoffmann Manufacturing Co., Ltd.,** is opening a new branch office on 13th September at 48-50, Blackness Road, Dundee (telephone: Dundee 3265). An emergency stock of ball and roller bearings will be carried, and an engineering service will be available.

The telephone number of the Newcastle-upon-Tyne branch of **Musgrave & Co., Ltd.,** is now Newcastle-upon-Tyne 26311.

The Merchant Adventurers of London, Ltd., inform us that by arrangement with Benjamin Electric, Ltd., they have agreed to change the name of "Flurolume," describing their fluorescent fittings, to "Fluorelume," in order to avoid confusion with the Benjamin Electric trade mark "Flurolier."

The Universal Distributing Co., Ltd., has moved to 201/211, Bishopsgate, London, E.C.2 (telephone: Bishopsgate 6777/8).

Modern Electric (Installations), Ltd., have now secured their own telephone number—Gulliver 5915.

Wembley Electrical Appliances, Ltd., Exhibition Grounds, Wembley Park, Middlesex, inform us that an incorrect photograph was inadvertently provided for their advertisement in our issue of 3rd September. The new lighting unit concerned is illustrated and described in their folder "WL/1."

Engineering Courses

The Manchester and District Advisory Council for Further Education has issued a pamphlet giving particulars of post-advanced lectures in electrical and mechanical engineering at the Royal Technical College, Salford, and the College of Technology, Manchester, during the 1948-49 session. Brief particulars of post-advanced courses in engineering at other technical colleges in the region are also given.

Indian Import Control

Further relaxations in the import control system have been announced by the Government of India. It has been decided that imporation can be made without a licence of certain specified articles from all soft currency areas and from Sweden and Switzerland, with the condition that goods are shipped from the last two countries on or before 31st January next. Among the articles included in this provision are motors of 30 h.p. and below; electrical instruments and accessories; rubber insulated copper wires; domestic refrigerators and parts; and radio receiving set components.

Plant for Russia

The Brush Electrical Engineering Co., Ltd., J. & H. McLaren, Ltd., and Mirrlees, Bickerton & Day, Ltd., have negotiated further contracts with the trade delegation of the U.S.S.R. for the supply of diesel engines and electrical equipment to Russia amounting to £3,500,000. With the earlier orders received the total is £6,500,000, a proportion of which is for equipment specified in the Anglo-Russian trade pact.

Trade Publications

Arcolectric (Switches), Ltd., Central Avenue, West Molesey, Surrey.—Catalogue of domestic lighting accessories, etc.

Mutron, Ltd., 40, Castle Street, Edinburgh, 2.—Priced catalogue of valve operated industrial testing instruments.

Metway Electrical Industries, Ltd., King Street, Brighton, Sussex.—Priced leaflet on an immersion type, non-automatic kettle element.

Westool, Ltd., St. Helen's Auckland, Bishop Auckland, Co. Durham.—Two leaflets describing the series 100 and 400 a.c. solenoids.

Malayan Radio Station

It is reported that work is shortly to begin in Johore on the erection of four 100-kW radio transmitters for the British Broadcasting Corporation, which will make the new station the most powerful in Asia. B.B.C. engineers

have completed their investigations and are ready to begin site clearance. The transmitters are still in England, but much ancillary equipment is already in Singapore.

The site of the station is Tebrau, 26 miles from Johore Bahru, where a small village is to be built to accommodate the engineering staff. The station will have its own power and water supply. The transmitters will be used almost entirely for relaying the B.B.C.'s Far Eastern service.

German Industrial Technique

Recently published reports on German industrial processes obtainable from H.M. Stationery Office, include the following:—B.I.O.S. 1714 (in 2 parts), "Electrical Aspects of Buna, with some notes on other Dielectrics" (69s. 6d.); B.I.O.S. 1716, "The German Electrical Indicating Instrument Industry—its Technique and Materials" (25s.) and B.I.O.S. 1762, "German Electro-Technical Ceramics" (4s. 6d.).

Company Registrations

During the first half of this year 9,827 companies were registered at Bush House, London, compared with 11,320 in the corresponding period of 1947. Details received from Jordan & Sons, Ltd., company registration agents, 116, Chancery Lane, London, W.C.2, show that 117 of these were public companies with a nominal capital of £2,784,000 and 9,710 were private companies with a nominal capital of £51,963,916. Of the total 944 were engineering companies.

Grain Drying

Installation at Leighton Buzzard Farm

By E. C. CLAYDON

TRADITIONALLY, seed crops are cut complete with stalk, sun-dried and stacked for storage, threshing being carried out at convenient periods throughout the season. The combine harvester reduces considerably the hazards of cutting, drying, storing and threshing, as it cuts and threshes in one operation. However, the moisture content of seed threshed immediately after cutting is normally above that suitable for storage and the seed has therefore to be dried artificially. Also, the increasing use of combine harvesters tends to flood the market with grain at harvest time, so the farmer gains who has storage facilities and can choose his time for marketing.

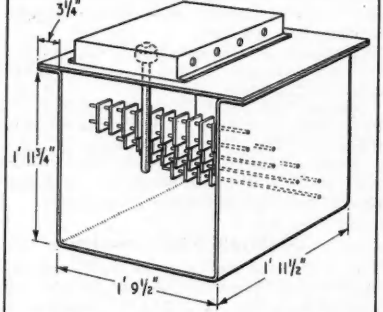


Fig. 1.—Arrangement of 21-kW air heater

Some of the various designs of grain dryer are doubtless familiar. In general they operate by passing warm or hot air through the damp grain, which is then conveyed to bins or other means of storage. Being designed to deal with the grain as it is harvested, they are of large output, say 3 tons per hour. Hence they are initially expensive, take up much space and represent a heavy maximum demand operating at a poor load factor, particularly if they are heated electrically, when the loading may be in the region of 200 kVA, necessitating costly supply arrangements.

The National Institute of Agricultural Engineering has recognized the smaller farmer's need for a cheap, easily constructed, simply operated plant which combines drying and storage facilities without danger of damaging the grain by overheating. Experiments have therefore been conducted with warm air blown through ventilated storage bins, culminating in the construction in 1947 of the first farm installation at Pitstone Green Farm, Leighton Buzzard. This comprises six cylindrical, reinforced concrete storage bins, each of 25 tons capacity and measuring 13 ft in diameter by 12 ft high. They have false porous floors of foamed slag blocks and stand in pairs on a concrete platform supported about a yard from the ground on brick walls. Warm air reaches the centre of the base of each bin through a 2-ft square concrete duct, insulated at top and sides by sawdust, which runs beneath

the platform. Shutters at each inlet allow ventilation of one or all of the bins at the same time.

The medium-speed air-driving fan is vee-pulley driven by a squirrel-cage motor, a maximum of 7 h.p. being required for an air volume of 5,000 cu ft per min. Heat is provided by a 21-kW air heater (Fig. 1) which drops into the top of the duct and is wired in three equal sections, each balanced across three phases to give sufficient control to satisfy varying conditions. The circuit is arranged (Fig. 2) so that the heater can only be switched on when the motor is running. A safety thermostat is built into the heater for added protection, should the air supply fail. The fan, motor, air heater and switchgear occupy a small building at one end of the plant.

Grain is placed in the bins as harvested and warm air is blown through it at the rate of 10 ft per min. Drying time depends on the state of the grain and the humidity of the air, but seldom exceeds a week. The process is continuous and automatic, eliminating labour beyond occasional inspection.

TABLE I

	Orthodox dryer	Ventilated bin dryer
Cost	£2,000 upwards	£700
Power required	5 to 20 h.p.	7 h.p. plus about 10 h.p. for elevators, etc., which need not be coincident
Heat required	100 to 200 kW	14 to 21 kW
Daily load factor	30 to 60 per cent day load	Up to 100 per cent or can be off-peak or night load
Output	½ to 3 tons per hour	Deals with total harvest

Air temperature is maintained some 10 deg F above ambient to achieve the necessary humidity. An automatic humidity controller can be fitted.

Electrically, the plant offers great advantages in respect of load factor and maximum demand and can normally be supplied without difficulty from the existing distribution system. A comparison with the orthodox dryer is made in Table I.

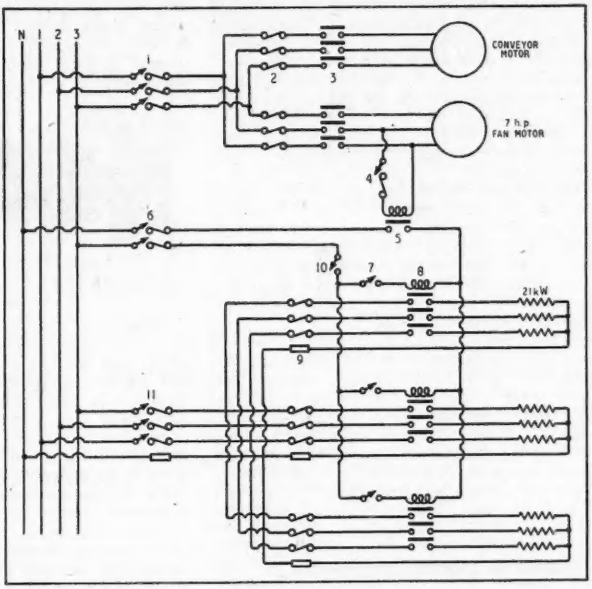


Fig. 2.—Connections of ventilated-bin dryer
1.—30-A switch fuse. 2.—30-A t.p. 2-way fuseboard. 3.—Star-delta starter. 4.—5-A s.p. switch fuse. 5.—415-V, 15-A s.p. contactor. 6.—10-A d.p. switch fuse. 7.—5-A 3-gang switch. 8.—15-A t.p. contactor. 9.—15-A 3-way t.p.n. fuseboard. 10.—Safety cut-out. 11.—30-A t.p.n. switch fuse

Although this plant removes most of the electrical disadvantages of orthodox dryers, the merits of the heat pump for drying and warming the air were investigated with a view to energy saving. Owing to the low annual load factor of the installation, however, it was found that the increased capital costs incurred more than outweighed the heat-unit reduction.

Luton Electricity Service acted as consultants throughout construction, supplied the equipment and assisted in test work. Acknowledgments are made to the National Institute of Agricultural Engineering and Mr. J. D. Hawkins of Pitstone Green Farm for permission to describe the installation. The heater was specially built by the General Electric Co., Ltd., and the installation work was carried out by Griffin Bros.

Aeronautical Equipment

AIRCRAFT CONSTRUCTORS' DISPLAY

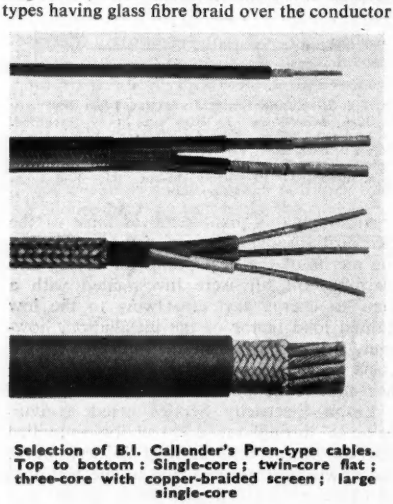
THE annual flying display and exhibition of aero-equipment and instruments arranged by the Society of British Aircraft Constructors (S.B.A.C.) has become the most important aeronautical event of its kind in this country.

Previously held at Radlett aerodrome, Herts, the show was transferred last year to the Royal Aircraft Establishment at Farnborough, Hants. At this year's display (7th to 13th September) the exhibitors of electrical equipment include the following:—

The English Electric Co., Ltd., which shows actuators for fuel pumps and undercarriages, flight control devices, alternators of variable and constant frequency, portable ignition tester. Among the items of the Plessey Co., Ltd., are wiring accessories, linear and rotary actuators, motor-driven fuel pumps, solenoid-operated valves and radio equipment.

The General Electric Co., Ltd., exhibits a 1-kW air circulating oven for heating frozen foodstuffs, a 0·5-gallon water heater and hot-cold tap, radio communication equipment, aerodrome lights and special projector lamps.

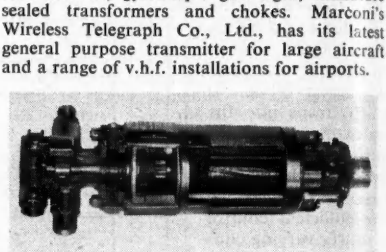
British Insulated Callender's Cables, Ltd., show aircraft flame-resisting cables of light weight for up to 250 V and 400 c/s, the "Pren" single-core, twin flat and three-core circular types having glass fibre braid over the conductor



Selection of B.I. Callender's Pren-type cables. Top to bottom: Single-core; twin-core flat; three-core with copper-braided screen; large single-core

(coloured to indicate rating) with vulcanized polychloroprene insulation (coloured for circuit identification). The "Prenmet" cables have an additional outer screen of braided tinned copper wires.

Ferranti, Ltd., display airborne radio navigation receiver, gyroscopic gun sight, miniature sealed transformers and chokes. Marconi's Wireless Telegraph Co., Ltd., has its latest general purpose transmitter for large aircraft and a range of v.h.f. installations for airports.



Sectional view of the Plessey "FP 3" electrically driven pump

Aerial mast and loop aerial housings, instrument cases, commutator assemblies, cable quads and guides, electrical insulation parts and similar components form the exhibit of Tufnol, Ltd. Airmec Laboratories, Ltd. (associated with the Radio & Television Trust, Ltd.) show a variety of instruments, testers, process timers, signal generators and a 2-kW radio-frequency heater.

The British Thomson-Houston Co., Ltd., has magnetos, actuators, motors, switches and lighting equipment. A three-unit motor-generator set recently developed for aircraft navigational supplies is driven by a d.c. motor of either 120 or 24 V, the main fields of the machines being excited by d.c. from the external source. The two a.c. 115-V outputs are 600 W at 1,600 c/s electronically controlled within $\pm$ 1 per cent and 500 W at 400 c/s controlled within $\pm$ 2·5 per cent by a carbon-pile regulator attached to a box on top of the machine, which contains radio-interference suppressors, starting relays, series condenser for the alternator and other auxiliaries. The weight of the machines, both regulators and control box is 75 lb, all designed to operate within the pressurized hull of airliners at any altitude.

Among other exhibitors, who numbered 185, were the Chloride Electrical Storage Co., Ltd., E. K. Cole, Ltd., Cossor Radar, Ltd., Decca Navigator Co., Ltd., Delco-Remy & Hyatt, Ltd., Desoutter Bros., Ltd., Electro Hydraulics, Ltd., Henry Hughes & Son, Ltd., K.L.G. Sparking Plugs, Ltd., Kelvin, Bottomley & Baird, Ltd., Lodge Plugs, Ltd., Joseph Lucas & Co., Ltd., Murphy Radio, Ltd., Newton Bros. (Derby), Ltd., Rediffusion, Ltd., Rotax, Ltd., Salford Electrical Instruments, Ltd., Sangamo Weston, Ltd., Short & Mason, Ltd., Smiths Aircraft Instruments, Ltd., Sperry Gyroscope Co., Ltd., Standard Telephones & Cables, Ltd., and Ultra Electric, Ltd.

FINANCIAL SECTION

Company News
Stock Exchange Activities

Reports and Dividends

The Victoria Falls & Transvaal Power Co., Ltd.—At the annual meeting held on 31st August Mr. A. E. Hadley (chairman) referred to the transfer of the undertaking to the Electricity Supply Commission of South Africa for the sum of £14,500,000. He said that the directors had taken counsel's opinion as to the rights of the preference stockholders. Some preference stockholders might take the view that the undertaking could not be disposed of until the end of 1950 and that their dividends would continue until that time. This was not the true position. The distribution of moneys was clearly defined by the memorandum and articles and these provisions should be complied with.

The position of the preference stockholders was raised by several speakers, and one stockholder suggested that ordinary holders be asked to give an additional 2s. 6d. per £1 stock unit to preference stockholders as compensation for loss of income due to the transfer of the undertaking before 1950. The chairman said that he considered it a hopeless situation for getting more than par on the present stock.

Murex, Ltd.—The difficulty of meeting the demand for welding electrodes was referred to by Mr. G. P. Joseph (chairman) at the annual meeting held on 31st August. He said that the improved demand for the products of the parent company in the closing months of the last financial year was maintained throughout the period under review. Owing to the continued shortage of steel supplies, Murex Welding Processes had been unable to meet the demand for welding electrodes and the Waltham Cross electrode plant had throughout the period worked considerably below capacity. The combined value of export sales of electrodes and welding plant for the ten months' period showed an increase which was attributable to increased sales of welding plant. The demand for welding electrodes in both the home and export markets greatly exceeded available supplies. There was unlikely to be any marked improvement in the present position until substantially larger quantities of steel were made available to electrode manufacturers.

Parmiter, Hope & Sugden, Ltd.—Speaking at the annual meeting held on 2nd September, Mr. V. Hope, who presided, said that the order book was still very full, but there were signs of a falling-off in orders for long delivery This was probably due to the fact that their competitors, being less busy than they were, were in a position to put forward more attractive delivery dates than they could, due to their having more than a year's orders in hand. The new Aeroflex "Ceram" fuse, which had a fusing factor as low as 1·25, and which came within the fixing dimensions of the standard link box fuses, had successfully passed the Association of Short-Circuit Testing Authorities' tests in all sizes. An extension to the factory had been put in hand to deal with the production of these fuses. The standby generating plant was completed last December, and this year they had no shut-downs to contend with. The supply of materials and labour was still a problem, and continued progress in turnover became increasingly difficult, but the present year had started with the first five months well in advance of last year, and they could confidently expect that their turnover would be in excess of that for the year under review.

The Hackbridge & Hewittic Electric Co., Ltd.—It is announced by the Anglo-Scottish Amalgamated Corporation that arrangements are being concluded for the introduction to the London Stock Exchange of the ordinary capital in the Hackbridge & Hewittic Electric Co. Subject to the approval of stockholders at an extraordinary meeting, which was to be held on 7th September, of the creation of 200,000 new ordinary shares of 5s. each, which will be offered to stockholders as rights at 9s. 6d., the Anglo-Scottish Amalgamated Corporation will underwrite the issue.

George Cohen, Sons & Co., Ltd., has decided to raise further capital by the issue of 500,000 additional 4½ per cent cumulative preference shares, and the Capital Issues Committee is being approached for its consent to the issue.

Ultra Electric (Holdings), Ltd., reports that the consolidated trading results for Ultra Electric (Holdings) and Ultra Electric show a profit, before providing for taxation, for the year ended 31st March last of £29,603, as compared with £55,878 for the preceding year, and a profit, after taxation, of £15,173 (against £28,886). The net profit of the Holdings Co., after deduction of tax, amounts to £7,225, representing the dividend paid by Ultra Electric, less expenses (against £19,363 for the previous nine months). It is proposed to pay a dividend of 5 per cent, less tax, for the year (against 12½ per cent, actual, for nine months).

Strand Electric Holdings, Ltd., reports a net profit for the year ended 30th April last, after providing for E.P.T. and profits tax but not income tax, of £32,980, as compared with £31,575 for the preceding year. General reserve receives £4,500, and the dividend for the year is maintained at 17½ per cent. The balance carried forward is £4,832 (against £4,428 brought in).

Thorn Electrical Industries, Ltd.—The full accounts now published show a net profit for the year ended 31st March last of the company and its subsidiaries, before providing for taxation, of £123,677. Taxation requires £71,108,

leaving a balance of £52,569, which with £15,697 brought in, makes £68,266 available. General reserve receives £15,000, and the ordinary dividend for the year is 25 per cent (unchanged). The balance carried forward is £26,749.

The Anglo-American Telegraph Co., Ltd., is to pay an interim dividend of 9s. per cent on the ordinary and 18s. per cent on the 6 per cent non-cumulative preferred for the three months ended 31st December last. This brings the total payment on the ordinary for 1947 up to 2·7 per cent, less tax, against 3¾ per cent for the preceding year. At the same time interim dividends for the first half of the current year of 30s. per cent on the ordinary and £3 per cent on the preferred ordinary will be paid. In 1947 there were three quarterly payments on the ordinary of ¾ per cent each.

Berry's Electric, Ltd., reports a profit for the year to 31st March last of £65,947, as compared with £89,900 for the preceding year, to which is added interest of £2,119, making £68,066. Depreciation receives £4,550, and after making other allocations, including £29,361 for tax and £10,000 to general reserve, it is proposed to pay an ordinary dividend for the year of 12½ (same). The balance carried forward is £8,914 (against £9,724 brought in).

The East African Power & Lighting Co., Ltd., proposes to pay a final ordinary dividend of 4 per cent, making 7 per cent, less tax for 1947 (same).

The Lancashire Dynamo & Crypto, Ltd., has announced an unchanged interim dividend of 5 per cent.

New Companies

Warm-Glow Co., Ltd.—Registered 21st August. Capital, £100. Electrical, mechanical and civil engineers, and contractors. Directors: F. Grisley and Mrs. Gertrude R. Grisley (secretary). Regd. office: 1133, London Road, Leigh-on-Sea.

Cohen Bros. (Electrical), Ltd.—Registered 20th August. Capital £300. Electrical engineers and contractors, etc. Directors: I. Cohen (secretary) and P. S. Cohen. Regd. office: 11, King Edward Buildings, Bury Old Road, Manchester, 8.

Boydfield Electrics, Ltd.—Registered in Edinburgh 23rd August. Capital, £500. Radio, electrical engineers and suppliers. Subscribers: H. C. Mitchell, Mrs. Isabella P. Mitchell and W. H. S. Mitchell. Secretary: H. C. Mitchell. Regd. office: 48, Caerlaverock Road, Prestwick.

Armastat Electrical Engineering, Ltd.—Registered 28th August. Capital, £100. Electrical engineers and contractors, etc. Directors: A. D. Appleby, J. J. Appleby, S. G. Wiltshear and H. E. White. Secretary: A. D. Appleby. Regd. office: Crown Works, Church Road, Norbiton, Surrey.

Emmerson & Stephenson (Electrical Contractors), Ltd.—Registered 28th August. Capital, £2,000. Manufacturers of all types of electrical apparatus, including wireless and television apparatus, etc. Directors: H. N. Robson, J. Emmerson, Mrs. Mary A. Emmerson, R. Stephenson and Mrs. Margaret I. Stephenson. Secretary: Georgina H. Robson. Regd. office: The Arcade, Chester-le-Street, Co. Durham.

Young & Wildsmith (Reading), Ltd. — Registered 26th August. Capital, £10,000. To acquire the business of electrical and radio distributors and merchants carried on by Young & Wildsmith, Ltd., at their Reading branch, etc. Directors: I. Giles and E. D. Young. Secretary: G. Clippingdale. Regd. office: 35, Little Russell Street, W.C.1.

Pearson Electric Co., Ltd.—Registered 30th August. Capital, £100. Electricians, electrical engineers and contractors, etc. Subscribers: H. R. Pearson and Mrs. Eileen M. Wanlees. Solicitors: Chadwick Son & Nicholson, Church Street, Dewsbury.

Companies to be Struck Off Register

The names of the following companies will be struck off the Register at the expiration of three months from 27th August unless cause is shown to the contrary:—British Horo-Electric, Ltd.; Electric Shavers, Ltd.; Pioneer Electrics (North-West), Ltd.

Meeting of Creditors

C. & D. Electric (Appliances), Ltd.—Meeting of creditors on 22nd September at the Law Library, Wood Street, Bolton.

Liquidations

Kamba Electric, Ltd.—Creditors' voluntary winding-up. Liquidator: Mr. A. E Attwood, Queen Street Chambers, 90, Queen Street, Cheapside, London, E.C.4.

Bankruptcies

J. W. Gatenby, residing and carrying on business at 7, High Street, Haverfordwest, electrician.—Receiving order made 30th August, 1948, on debtor's own petition.

W. Millis, 284, Archway Road, Highgate, London, electrical engineer, lately carrying on business and residing at 278, Archway Road, Highgate.—First meeting 15th September and public examination 26th October, both at Bankruptcy Buildings, Carey Street, London, W.C.2.

T. Shaw, residing at 65, Perth Street and carrying on business at 495a, Anlaby Road, both in Kingston-upon-Hull, radio and electrical engineer, trading as Radio & Electrical Service Engineering Co.—Trustee, Mr. H. S. Bloomer, 8, Flottergate, Great Grimsby, Official Receiver, released 26th August, 1948.

STOCKS and SHARES

STOCK Exchange prices remain firm, in spite of a slight contraction of business, for which political possibilities are responsible. During the past week, radio shares have again gone ahead under the genial influence of speculative purchases, based, as a rule, upon the prospects of television expansion.

The Anglo-American Telegraph Company has decided to make a partial payment of the dividends which were due last February. The deferred stock rose 2 to 24½; the preferred eased off to 119½. Manufacturing and equipment shares are steady; when prices move, it is generally upwards. Berlin and Margate serve to hold in check the widening circle of public interest which, a week ago, showed signs of revival in stocks and shares.

Autumn Issues

The famine in debenture stocks and good-class preference shares continues; for the gilt edged ordinary shares, there is mild but persistent buying pressure. It is known that in the coming autumn a spate of fresh appeals for money is likely to be released, not only by new concerns, but by many older-established undertakings, the extension of whose business is at present cramped by need for extra capital. There is no lack of money that requires employment. Much of it lies in the banks, its holders only waiting for sufficiently tempting opportunities for them to use the capital in permanent investments. The 3 per cent British Transport stock has risen to the best point touched so far since the issue was first made, and at 99 compares with 100½, the present quotation for British Electricity 3 per cents. The security of both issues is identical, but, as already mentioned here, the Electricity stock is dated 1968-1973, whereas the dates of the Transport stock are 1978-1988.

Radio Shares

Pye deferred shares provide a good feature in the radio market; the price put on 3s. 9d. to 26s. 3d., on a considerable volume of buying. The yield has consequently come down to 4½ per cent, which seems a reasonable return from shares in a company that clearly has a promising future as well as a sorry present foundation. Cossor and E. K. Cole have also come into the limelight with gains of 1s. 6d. to 12s. and 17s. respectively. On the other hand, Electric & Musical shares at 17s. 6d. show a reaction of $\frac{1}{16}$, a rise in these having taken place two or three weeks ago. In addition to the shares in the companies directly interested, those in undertakings which deal with radio component parts also show improvement. General Electrics, for instance, after their rise of 4s. 6d., are again rather better at 86s. 3d. Plessey at 15s. have gained 2s. 6d. Radio & Television at 5s. 6d. are 6d. to the good. Ultra Electrics fell to 4s. on a cut in dividend from 12½ (for nine months) to 5 per cent. A recovery to 5s. followed the published explanation for the drop in profits.

Thorn Electrical

Thorn Electrical Industries is to hold its meeting on 24th September when there will be presented the satisfactory report showing an increase in the net profits of the consolidated company of about £10,000. Six months ago the company offered 400,000 5 per cent 2nd preference shares at 22s. and at that time the official estimate was that profits for the year ending on 31st March last would not be less than those of the preceding year. Trading profits and net profits are both well up on the estimate. The ordinary dividend is maintained at 25 per cent and at the present price of 18s. 9d. for the 5s. shares, the yield comes to £6 13s. 4d. per cent. The company and its subsidiaries manufacture Atlas electric lamps, fluorescent lighting fittings, television receivers, and other appliances. The issued capital is £626,250, of which £176,250 is in ordinary shares of 5s. each. For the ten years 1937-1946, inclusive, the company paid dividends of 20 per cent annually; the rate was raised to 25 per cent two years ago

The Week's Price Changes

Rises of 2s. 6d. this week have made Chloride Electrical 97s. 6d. and Lancashire Dynamo 102s. 6d., the latter price also serving for Thomas Tilling shares. Tube Investments are 2s. 6d. up at 126s. 3d. Crabtree Electrics, 42s. 3d., have gained 9d. International Combustions at 41s. 3d. are $\frac{1}{16}$ better. Amongst others to improve are British Insulated Callenders, 34s., Crompton Parkinson, 26s. 6d., English Electric, 46s. 3d. Imperial Chemicals are 44s. 9d. The new shares came on offer at 3s. 3d. premium; the latest day for making application, and paying the first call of 10s. per share, is Tuesday, 14th September. British Electric Traction deferred advanced 25 to 1,625. Cable & Wireless stocks, preferred 125½ and ordinary 195½, are better, and Globe Telegraph ordinary rose $\frac{1}{16}$ to 43s. 9d. Shares in the heavy industries are a good market; Babcock & Wilcox at 69s. have advanced a florin. Revo 59s. 6d., Siemens 33s. 6d. Ever Ready 36s. 9d. and De la Rue 40s., are all harder on the week. Dividend hopes account for a 3s. rise, to 32s. 6d., in Calcutta Trams.

Preferences on Offer

General Electric 4½ per cent "C" preference, on which the dividend is cumulative, can be bought as to 5,000 shares at 23s. 1½d. to give £3 13s. 6d., and a similar number of Reyrolle 4 per cent cumulative redeemable preference, available at 22s., will return £3 12s. 9d. per cent. Atlas Electric & General 7 per cent cumulative preference, to the number of 10,000, are on offer at 34s. 3d. to yield at that figure £4 1s. 9d. per cent.

Malayan Imports

SUBSTANTIAL INCREASE IN 1947

OFFICIAL statistics of the import trade of Malaya for 1947 have recently been issued. From them the values of the imports of electrical goods have been extracted, together with the chief countries of supply. They are shown in the accompanying table with comparative figures for 1946. There is, however, an official warning that the returns are not strictly comparable because in 1946 certain imports on Government account could only be estimated. The total value of electrical apparatus imported last year was $21,680,000 against $8,526,000 in 1946 and of electrical machinery $2,133,000 against $1,060,000. It will be seen that the advance ran through virtually all the different groups. The entry of Australia into various branches of the trade is noteworthy. (Malayan dollar = 2s. 4d.)

Class of Goods and Supplying Countries	1947 $ (000)	Inc. or dec. on 1946 $ (000)
Automobile lamp bulbs	172	+ 154
From U.K.	103	+ 95
„ *U.S.A.*	54	+ 50
Flash and torch lamp bulbs	145	+ 114
From Hong Kong	70	+ 66
„ *U.S.A.*	27	+ 24
Other electric light bulbs, 60 W and under	613	+ 2
From U.K.	390	+ 133
„ *Australia*	107	− 214
„ *Belgium*	38	+ 38
„ *Holland*	61	+ 29
Ditto, 61 W to 150 W	236	− 13
From U.K.	189	+ 73
„ *Australia*	19	− 105
„ *U.S.A.*	21	+ 21
Ditto over 150 W	92	+ 31
From U.K.	81	+ 43
„ *Australia*	6	− 14
„ *Holland*	5	+ 2
Electric hand flash lamps	1,034	+ 551
From Hong Kong	831	+ 463
„ *U.S.A.*	51	+ 49
„ *China*	62	+ 35
Other electric lamps	184	+ 99
From U.K.	116	+ 76
„ *Australia*	27	− 17
Electric lighting accessories	865	+ 590
From U.K.	685	+ 490
„ *U.S.A.*	100	+ 98
Electric refrigerators and parts	2,240	+ 1,862
From U.K.	161	+ 31
„ *U.S.A.*	1,912	+ 1,788
Electric fans	671	+ 494
From U.K.	536	+ 419
„ *India*	51	+ 51
„ *Australia*	44	+ 12
Wires and cables, not telegraph or telephone, rubber insulated	2,562	+ 1,773
From U.K.	2,478	+ 1,742
„ *Australia*	70	+ 19
Ditto, insulation other than rubber	565	+ 239
From U.K.	512	+ 203
„ *Australia*	49	+ 32
Ditto, telegraph and telephone	116*	+ 51
Ditto, submarine	709*	− 106
Electro-medical apparatus	53	+ 47
From U.K.	38	+ 32
„ *U.S.A.*	15	+ 15
Electrical instruments, not telegraph or telephone	415	+ 261
From U.K.	367	+ 225
„ *U.S.A.*	41	+ 36
Batteries	1,586	+ 1,407
From U.K.	1,116	+ 1,096
„ *Canada*	221	+ 216
„ *U.S.A.*	141	+ 141
„ *Australia*	50	+ 6
Batteries for hand flash lamps	2,221	+ 533
From Hong Kong	535	− 201
„ *Australia*	463	− 118
„ *U.S.A.*	811	+ 682
Accumulators, wet	23*	+ 12
Radio receiving sets, excluding valves	3,398	+ 2,659
From U.K.	2,568	+ 1,962
„ *Holland*	286	+ 249
„ *U.S.A.*	259	+ 257
„ *Australia*	202	+ 112
Radio transmitting sets, excluding valves	255	+ 100
From U.K.	233	+ 80
„ *U.S.A.*	21	+ 21
Radio valves	135	+ 102
From U.K.	125	+ 98
„ *Australia*	5	— 1
Radio parts and accessories	402	+ 277
From U.K.	358	+ 256
„ *U.S.A.*	28	+ 24
Telegraph and telephone apparatus other than radio	617	+ 435
From U.K.	607	+ 435
„ *U.S.A.*	4	− 6
Electrical goods and apparatus n.e.s.	2,292	+ 1,421
From U.K.	1,970	+ 1,285
„ *Canada*	45	+ 6
„ *Hong Kong*	8	− 7
„ *Australia*	93	+ 16
„ *France*	12	+ 12
„ *U.S.A.*	136	+ 88
Convertors and transformers	416	+ 387
From U.K.	375	+ 360
„ *Australia*	24	+ 21
„ *U.S.A.*	17	+ 16
Generators	443	+ 93
From U.K.	214	− 62
„ *Australia*	29	+ 18
„ *U.S.A.*	194	+ 153
Motors, 25 h.p. and under	415	+ 258
From U.K.	356	+ 230
„ *Canada*	16	+ 16
„ *U.S.A.*	31	+ 20
Motors, 26 h.p. to 100	190	+ 122
From U.K.	178	+ 111
„ *Australia*	11	+ 11
Motors over 100 h.p.	143	+ 49
From U.K.	130	+ 63
„ *U.S.A.*	13	+ 8
Other electrical machinery	212	+ 4
From U.K.	160	+ 8
„ *Canada*	11	− 42
„ *Australia*	4	+ 2
„ *U.S.A.*	34	+ 34
Switchgear	314	+ 161
From U.K.	293	+ 151
„ *Australia*	11	+ 8

* All or mainly from U.K.

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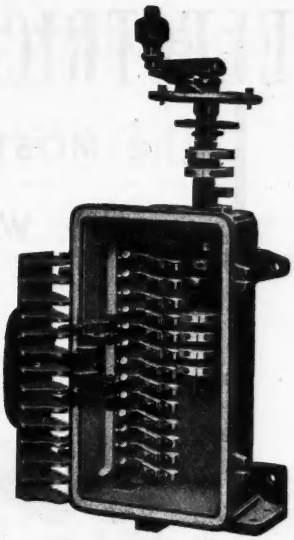

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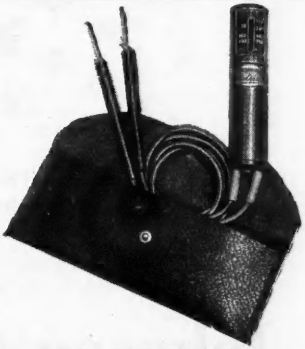

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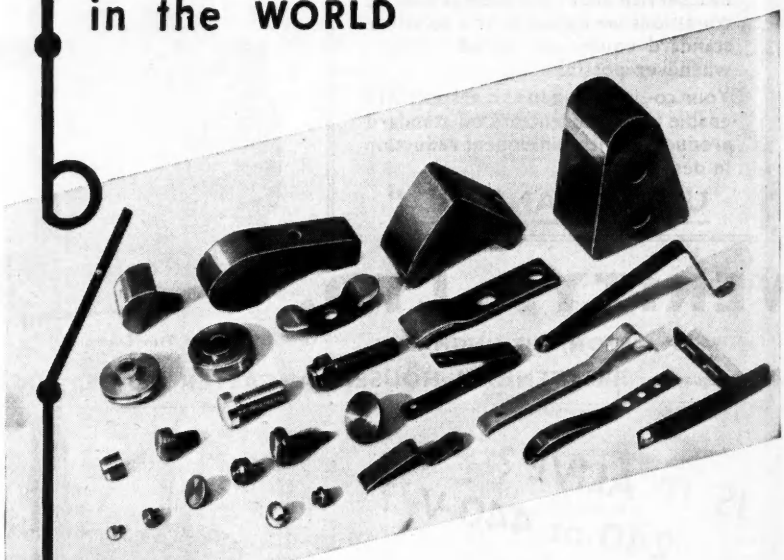

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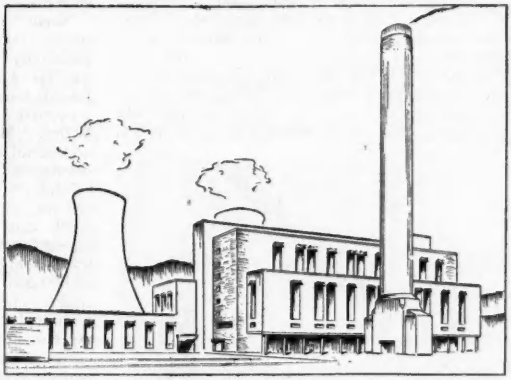
South African Commission

EXTENSION OF OPERATIONS

TWENTY-FIVE years of close association between the Electricity Supply Commission of South Africa and the Victoria Falls & Transvaal Power Co., Ltd., culminated on 1st July in the purchase by the Commission, for £14,500,000, of the company's undertaking in the Union. The installed capacity of the Commission's power stations has thereby been raised to 1,340,750 kW, representing a considerable proportion of the Union's total capacity (given in the 1945-46 industrial census as 2,148,731 kW).

This transfer was subsequent to the period covered by the latest report of the Commission which saw other extensions of its activities. In the new Border undertaking, embracing an area of 21,500 sq miles, it took over the operation of the East London power station and purchased the King William's Town and Alice municipal undertakings, while it was also granted a licence for the Greater Rand Extension undertaking covering approximately 16,000 sq miles, including the new goldfields around Odendaalsrus.



Design of new power station to be erected at Worcester, Cape Province

The report, signed by Dr. H. J. van der Bijl, chairman, records a continued increase in demand for electricity, and indicates that progress in the future is likely to be even greater than hitherto. Deliveries of plant showed some improvement in 1947, but lack of supplies continued to retard the execution of the Commission's projects. These include the construction of new power stations near Vierfontein and at Worcester, Cape Town and Pinetown.

The Vierfontein station is required for the new goldfields in the Orange Free State and will be designed for a maximum capacity of 165,000-200,000 kW, excluding house sets. The Worcester station is mainly to provide power for the electrification of 195 miles of railway from Bellville to Touws River but will also supply municipalities and farms as well as the numerous industries which, it is already evident, will be attracted to the area. The initial installation will be 60,000 kW, to be increased later to 100,000 kW, the cost exceeding £4 million. The Pinetown station, in Natal, will be interconnected with the Colenso and Congella stations to provide for the rapid growth in demand in the province. Its initial capacity will be 60,000 kW, later to be increased to 240,000 kW. The maximum demand on the Cape Town pooled stations is expected to rise from 190,000 kW in 1949 to 326,000 kW in 1959 and the plans for meeting this envisage a new station adjacent to that at Salt River, starting with two 30,000-kW sets to which four others will be added; the estimated total cost is £8 million.

At 31st December, 1947, equipment in course of installation or on order included 315,000 kW of generating plant.

During 1947 5,299 million kWh was generated, an increase of 2·3 per cent; this would have been greater but for a strike of workers at gold mines. The Klip station, which accounted for roughly half the total output, had a thermal efficiency of 20·64 per cent. At the Vaal station, where the third 33,000-kW Ljungström set from Sweden, long delayed by transport difficulties arising from the war, was commissioned during the year, 669 million kWh was sent out, the thermal efficiency being 22·37 per cent.

Coal consumption at all stations (in short tons) aggregated 4,331,800, the lowest price paid being 3s. 4d. per ton at Witbank and the highest 28s. 1d. at Salt River.

Sales totalled 5,114 million kWh, which included 3,819 million in bulk supplies for mining. The average cost per kWh sold was 0·2141d. while the average revenue exceeded this figure by only 0·0004d. Income rose by 11·5 per cent to £4,573,125 and expenditure by 11·4 per cent to £4,564,419, leaving a balance of £8,706 compared with £4,702 in 1946. Expenditure on capital account during the year amounted to £2,398,451, making £28,824,847 to date, and with the completion of all the works authorized this will rise to £45,500,000.

Electricity Supply

Birkenhead—Wallasey 132-kV Line. North Wales Water Power.

Birkenhead. — OVERHEAD LINE INQUIRY DECISION.—Approval has been given by the Minister of Fuel and Power to the scheme of the British Electricity Authority for the erection of a 132-kV overhead line from Birkenhead to Wallasey. At a public inquiry in April the B.E.A.'s application was opposed by Wallasey and Birkenhead Corporations, Cheshire County Council and Hoylake U.D.C. With regard to the proposed line to Hoylake which was to have had a branch at Bidston, the Minister states that he is not satisfied that the route proposed for this line is the most appropriate, and he is of the opinion that there should be further consultation between the Authority and the Merseyside and North Wales Electricity Board.

Clearing the site for a new London power station. The old Import Dock at the West India Docks has been drained and is now being cleaned out

Dundee.—FLUORESCENT STREET LIGHTING.—Following the introduction of fluorescent street lighting in Glasgow, Aberdeen and Stirling, the Public Lighting Department of the Dundee Corporation has completed a similar installation in one of the burgh's main thoroughfares, Reform Street. This latest lighting system consists of " Mazdalux " fluorescent 3-lamp lanterns, supplied by the B.T.H. Co., Ltd., suspended from catenary wires. Six units are each mounted at 26 ft over the centre of the roadway, being spaced at intervals of 120 ft.

Greenock.—STREET LIGHTING.—The Corporation is asked by the Streets Committee to approve a five-year plan for the installation of sodium lighting in all the streets of the town carrying any appreciable amount of vehicular traffic. During the first year it is planned to convert the lighting in the entire main thoroughfare stretching from Gourock to Port Glasgow, a distance of about four miles.

North Wales.—HYDRO-ELECTRIC DEVELOPMENTS.—Lord Citrine, chairman of British Electricity Authority, at a conference of the Central Authority and chairmen of the Area Boards held at Llandudno last week referred to projected hydro-electric schemes in North Wales. He said that at Dolgarrog 3,400 additional acres of catchment area was being developed. This would yield on an average rainfall 9,000,000 to 11,000,000 kWh per annum, equivalent to a saving of 6,000 to 8,000 tons of coal every year. At Maentwrog an additional catchment area of 14½ sq miles was being developed. This would yield 20,000,000 kWh per annum, equivalent to a coal saving of 12,000 to 15,000 tons a year. A preliminary survey of water power resources in the North Wales area had revealed the potentialities of six major and a number of minor hydro-electric schemes with an aggregate output of more than 520,000,000 kWh in an average year. This was five times the present water power yield in North Wales and corresponded to a coal saving of 350,000 tons per annum. Investigations were not beyond the preliminary stage and unexpected technical difficulties might emerge in some cases.

Scotland.—POWER SCHEME ALMOST READY.—First of the North of Scotland Hydro-Electric Board's power schemes will come into operation at Nostle, about nine miles from Kyle of Lochalsh, in six weeks' time. The project, which was started two years ago, will supply the Kyle, Plockton Peninsula, and the southern part of Skye. Mr. Tom Fraser, Under-Secretary for Scotland, and Lord Morrison visited Nostle on 2nd September. The Board is to abandon its Stornoway scheme prepared for the River Creed which flows into Stornoway harbour. The Fisheries Advisory Committee's recommendations for the preservation of the salmon stock hampered the scheme and made it uneconomic.

St. Helens.—STREET LIGHTING.—The Corporation is installing mercury-vapour lighting along the chief traffic routes at a cost of more than £5,000. The main scheme, still in abeyance, provides for a new lighting system over 15 miles of trolley-bus routes at a cost of £20,000.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1943

SPERRY GYROSCOPE Co., Inc.—"Tuning means for electron-discharge devices." 1588. 29th January, 1942. (606794.)

1944

Communications Patents, Ltd., and P. Adorjan.—"Apparatus responsive to variation of the amount of wattless current." 6760. 12th April, 1944. (606650.)

Telefonaktiebolaget L. M. Ericsson.—"Indicating devices for finger dials, and like apparatus." 9136. 14th May, 1943. (606651.)

British Thomson-Houston Co., Ltd.—"Dynamo-electric machines." 11429. 17th June, 1943. (606652.)

Marconi's Wireless Telegraph Co., Ltd.—"Television transmitting tube." 12150. 24th June, 1943. (606653.)

J. F. O'Brien and E. S. Boynton.—"Electromagnetic switches." 19336. 30th October, 1943. (606881.)

Igranic Electric Co., Ltd.—"Electric motor controllers." 21167. 30th October, 1943. (Addition to 571669.) (606655.)

Rotol, Ltd., R. H. Streete and W. Whitticase.—"Apparatus for the treatment of materials by high-frequency electric current." 25251. 15th December, 1944. (606556.)

1945

Sperry Gyroscope Co., Inc.—"High-frequency electron-discharge apparatus." 1238. 29th January, 1942. (Divided out of 606794.) (606802.) "Hollow resonators for electro-magnetic waves." 1239. 29th January, 1942. (Divided out of 606794.) (606803.) "Reflex electron-discharge modulator devices." 2308. 29th January, 1942. (Divided out of 606794.) (606804.)

Novobax, Ltd., and A. V. Sharman.—"Electric tumbler-switches." 4006. 16th February, 1945. (606660.)

Autophon Akt.-Ges.—"Subscriber's calling device for loud-speaking telephone systems." 5804. 6th November, 1942. (606805.)

Telephone Manufacturing Co., Ltd., and H. Lovesey.—"Electric contact plugs." 9265. 13th April, 1945. (606662.)

F. E. Squire (Reliance Electric & Engineering Co.).—"Automatic electrical speed control systems." 12582 18th May, 1945. (606668.)

Liquidometer Corporation.—"Telemetering devices." 14222. 11th December, 1944. (606808.)

British Thomson-Houston Co., Ltd.—"Control of electric motors." 14707. 13th June, 1944. (606670.)

Polytechnic Institute of Brooklyn.—"Attenuators for electric waves." 15184. 14th June, 1944. (606891.)

A. F. Feketey.—"Electric heating." 15655. 18th June, 1946. (606894.)

Soc. Anon. des Manufactures des Glaces et Produits Chimiques de St.-Gobain, Chauney et Cirey.—"Electric furnaces." 17992. 24th June, 1940. (606566.)

Communications Patents, Ltd., and E. C. Stanley.—"Drying material in vacuo by high-frequency dielectric heating." 18578. 20th July, 1945. (606567.)

F. C. Williams.—"Electrical integrating circuits." 18701. 20th July, 1945. (606673.)

M. C. Goodall and C. S. Wright.—"Coaxial-line resonant circuits and oscillators or wavemeters incorporating such circuits." 20691. 11th August, 1945. (606675.)

Standard Telephones & Cables, Ltd., and G. Gilliver.—"Electrical welding." 22903. 5th September, 1945. (606572.)

Standard Telephones & Cables, Ltd., and D. S. Ridler.—"Means for counting electrical impulses." 23773. 14th September, 1945. (606680.)

Marine Engineering Co. (Stockport), Ltd., and H. Stanway.—"Clutch and pulley driving assembly for electric motors." 24621. 22nd September, 1945. (606574.)

British Broadcasting Corporation and A. G. Warren.—"Variable reactance devices for use for example for the frequency-modulation of electric oscillations." 25014. 26th September, 1945. (606682.)

O. L. Ratsey and J. Buckingham.—"Electric pulse generators." 25266. 28th September, 1945. (606904.)

Steatite & Porcelain Products, Ltd., Dubilier Condenser Co. (1925), Ltd., P. R. Coursey and L. J. Snell.—"Potential-dividing electric circuits." 25403. 1st October, 1945. (606812.)

E. de Selgas y Marin.—"Switching arrangements for impedance networks." 29661. 20th January, 1945. (606693.)

T. E. Wynne.—"Electric remote indicating or control systems." 31682. 23rd November, 1945. (606579.)

Electro Methods, Ltd., H. L. Schuster and H. Fuchs.—"Electrical distilling apparatus." 32388. 30th November, 1945. (606698.)

Soc. Independante de Telegraphie Sans Fil.—"Frequency transposing devices." 32465. 19th July, 1944 (Cognate applications 32466/45 and 32468/45.) (606910).

Marconi's Wireless Telegraph Co., Ltd.—"Television radio signalling systems." 32482. 30th November, 1944 (606580.)

Marconi's Wireless Telegraph Co., Ltd.—"Modulated carrier wave systems." 33823. 28th October, 1942. (606582.)

Marconi's Wireless Telegraph Co., Ltd., R. J. Kemp and R. F. O'Neill.—"Radio direction finding systems." 33963. 14th December, 1945. (606583.)

R. Crittall & Co., Ltd., and H. D. T. Waldram.—"Electric conduit and cable junction boxes." 34139. 4th December, 1946. (606911.)

A. C. Cossor, Ltd., and A. H. A. Wynn.—"Cathode-ray tube circuits." 34591. 20th December, 1945. (606913.)

1946

Sulzer Freres Soc. Anon.—"Electric generating plants for the propulsion of vehicles." 42. 30th January, 1945. (606915.)

Westinghouse Electric International Co.—"Motor control systems." 939. 10th January, 1945. (606820.)

K. A. Hartley.—"Selective coupling circuits for use at radio frequencies." 1494. 16th January, 1946. (606821.)

Standard Telephones & Cables, Ltd., and W. J. Reynolds.—"Telecommunication exchange systems." 1496. 16th January, 1946. (606596.)

P.A.M., Ltd., H. B. W. Holt and G. Haynes.—"Electric heating devices." 1499. 16th January, 1946. (606597.)

Soudure Electrique Autogene Soc. Anon.—"Welding electrode or rod and manufacture thereof." 1504. 17th January, 1945. (606598.)

British Thomson-Houston Co., Ltd.—"Permeability tuned loop antenna circuits." 1513. 19th January, 1945. (606599.)

W. G. Weekes.—"Push-button electric switches." 1546. 16th January, 1946. (606611.)

Midland Dynamo Co., Ltd., and C. P. Starfield.—"Armature winding machine." 1585. 17th January, 1946. (606721.)

W. T. Glover & Co., Ltd., and E. L. Davey.—"Leakage indicating device for gas-filled electric cables, pipe lines, or the like." 1598. 17th January, 1946. (606722.)

Allmanna Svenska Elektriska Aktiebolaget.—"Compressed air blast circuit-breakers." 1602. 31st January, 1945. (606725.)

Integral, Ltd., R. F. Worlidge and E. P. Bridson.—"Momentary contact electric switches." 1649. 17th January, 1946. (606736.)

D. Napier & Son, Ltd., and F. R. F. Ramsay.—"Apparatus for testing the electrical ignition systems of internal-combustion engines." 1658. 17th January, 1946. (606739.)

R. C. Mildner.—"Electric cables." 1720. 18th January, 1946. (606752.)

Allmanna Svenska Elektriska Aktiebolaget.—"Compressed air blast circuit-breaker of pillar type." 1734. 3rd February, 1945. (606754.) "Arrangement in compressed air circuit-breakers with parallel resistance." 1735. 6th February, 1945. (606618.)

Philips Lamps, Ltd.—"Method of electric-arc welding." 1755. 15th March, 1941. (606760.)

Naamlooze Vennootschap Philips' Gloeilampenfabrieken.—"Apparatus for recording sound." 1756. 29th March, 1941. (606761.) "Blocking-layer cells. 1757. 21st April, 1941. (606762.) "Selenium rectifiers." 1758. 7th May, 1941. (606763.)

Standard Telephones & Cables, Ltd.—"Modulating apparatus particularly for radio beacons." 1825. 27th June, 1944. (606779.) "Frequency modulation system for electric signalling." 1828. 23rd January, 1945. (606780.) "Transformer-rectifier unit." 1830. 25th January, 1945. (606781.)

British Insulated Callender's Cables, Ltd., and H. A. Baker.—"Gauging device for use in making paper insulated cable joints and terminations." 1874. 19th January, 1946. (606791.)

A. R. Wigeland.—"Electrically heated water container." 1903. 10th February, 1941. (606619.)

A. E. Chapman.—"Electric light lanterns." 1933. 21st January, 1946. (Cognate application 34398/46.) (606833.)

Wilmot-Breedon, Ltd., and F. V. Lewis.—"Electromagnetic switches." 1935. 21st January, 1946. (606840.)

British Thomson-Houston Co., Ltd.—"Control of grid-controlled gas or vapour electric-discharge devices." 1959. 4th August, 1941. (606844.)

General Electric Co., Ltd., and R. W. W. Sanderson.—"Layer cell assemblies for primary electric batteries." 1973. 21st January, 1946. (606846.)

D. L. Savage.—"Control apparatus for electrical circuits." 1988. 21st January, 1946. (606851.)

Electruks, Ltd., and W. Reeves.—"Electrical or petrol driven trucks and similar vehicles." 1999. 21st January, 1946. (606857.)

H. A. H. Nijland.—"Gas blast electric circuit-breakers." 2009. 19th February, 1942. (606860.)

Standard Telephones & Cables, Ltd., and M. Richards. "Ballast lamps." 2087. 22nd January, 1946. (606928.)

Standard Telephones & Cables, Ltd., H. Wolfson and S. C. Shepard.—"Thermo-sensitive resistance elements." 2098. 22nd January, 1946. (606932.)

Raytheon Manufacturing Co.—"Electron-discharge tube sockets." 2486. 28th February, 1945. (606703.)

Standard Telephones & Cables, Ltd.—"Remote control system." 3269. 26th February, 1945. (606622.)

Dubilier Condenser Co. (1925), Ltd.—"Water-cooled high-voltage electrical devices, such, for example, as electronic-discharge devices." 3310. 3rd February, 1945. (606793.)

Automatic Coil Winder & Electrical Equipment Co., Ltd., and S. R. Wilkins.—"Method of and apparatus for testing thermionic valves." 5006. 18th February, 1946. (606707.)

Western Electric Co., Inc.—"Translating devices for electric waves and methods of preparing them." 6129. 14th December, 1944. (606626.)

Amended Specifications

Marconi's Wireless Telegraph Co., Ltd., & anr.—"Modulation systems for radio and like transmitters." (540245.)

Westinghouse Electric International Co.—"Turbine apparatus." (582152.)

Standard Telephones & Cables, Ltd.—"Antenna couplings." (597736.)

Trade Marks

APPLICATION has been made for the registration of the following trade marks. Objections may be entered within one month from 1st September:—

ULTRIC. No. 655,973, and ULTRONIC. No. 655,974. Class 7. Electric motors (other than electric motors for land vehicles); electric mechanisms for operating, by remote or correspondence control, the controls of industrial machinery, engines, motors, aircraft and of steering gear for vehicles; speed governors for machines; electric generators, electric alternators; and parts included in Class 7 of all the aforesaid goods.

ULTRASCOPE. No. 655,971 and ULTRAPHONE. No. 655,972. Class 9. Wireless telegraphic, wireless telephonic and television transmitting, receiving and amplifying apparatus; electric and electronic control apparatus included in Class 9; radar apparatus; electrically-operated testing and calibrating apparatus; speed-indicating, recording and governing apparatus included in Class 9; and condensers, resistances, magnets, gramophone pick-ups, sound amplifiers and cut-outs, all being electrical apparatus; and parts included in Class 9 of all the aforementioned goods.

ULTRON. No. 655,975. Class 12. Aeronautical apparatus included in Class 12; electric motors for land vehicles and parts special to such motors; and component parts included in Class 12 of aircraft, watercraft and land vehicles.—Ultra Electric, Ltd., Ultra Works, Western Avenue, Acton, London, W.3.

STARTEX. No. 660,072. Class 9. Electric batteries and electric accumulators.—The Chloride Electrical Storage Co., Ltd., Exide Works, Clifton Junction, near Manchester.

Design (eye on a globe). No. 670,562. Class 7. Electric washing machines. No. 660,911. Class 9. Radio apparatus and television apparatus. No. 670,563. Class 11. Installations for lighting, heating, cooking, refrigerating, drying and ventilating.—Cuttriss Radio & Electrical, Ltd., 1178, Warwick Road, Acocks Green, Birmingham, 27.

AMBASSADOR. No. 661,433. Class 9. Electric vacuum cleaners, electric flat irons, electric domestic utensils included in Class 9, and parts included in Class 9 of all such goods.

AMBASSADOR. No. 661,434. Class 11. Refrigerators; and electrically-operated or electrically-powered installations and apparatus for lighting, heating, cooking, drying, ventilating, water supply for domestic purposes.—R. N. Fitton, Ltd., Radio Works, Hutchinson Lane, Brighouse, Yorks.

SILEX.—No. 661,966. Class 9. Electrically-operated coffee-makers, tea-makers and percolators, none forming parts of installations.—Silex Household Products, Ltd., Town Hall Buildings, Reading Lane, Mare Street, London, E.8.

ZEDA. No. B658,272. Class 11. Electric cooking, heating and drying apparatus (other than drying machines); fans, electric gas-lighters, lighting fittings, lighting frames, torches, electric kitchen utensils included in Class 11 and electrically operated refrigerators. — Z Electric Lamp & Supplies Co., Ltd., Zeda House, 21, Newman Street, Oxford Street, London, W.1.

ELBCO. No. 663,455. Class 11. Electric boiling plates, being parts of electric cooking stoves.—Electric Boiling Plates, Ltd., 25-31, Shard Road, Peckham, London, S.E.15.

CONTRACT INFORMATION

ACCEPTED TENDERS AND PROSPECTIVE ELECTRICAL WORK

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Argentina.—Grain Elevator Board (Ministerio de Obras Publicas—Construcción de Elevadores de Granos, Av. 9 de Julio 1925, Buenos Aires). 25th October. Supply and erection of equipment for transmitting orders by visible signals and by sound.

Sanitary Works Department (Obras Sanitarias de la Nación, Charcas 1840, Buenos Aires). 8th October. Electrically driven deep well pumping set with piping and accessories.

Burton-on-Trent.—25th September. Corporation. Radio relay system. (See this issue.)

Carrickfergus.—25th September. U.D.C. Ten electrically driven automatically controlled vertical spindle centrifugal sewage pumps, to be installed in five pumping stations. Waterhouse & Rounthwaite, 165, Westmorland Road, Newcastle-on-Tyne.

Dorset.—The County Council invites contractors and manufacturers to make application by 24th September for consideration in respect of work or materials for its building and maintenance work, which includes water heating and electrical installations, refrigeration and cold storage, X-ray apparatus and hospital equipment and cooking equipment. (See this issue.)

Iran.—ISFAHAN.—Tenders will shortly be invited for the supply and installation of h.v. cables, overhead lines, switchgear, transformers, meters, etc., for a distribution system in the city. (See this issue.)

Kidsgrove.—23rd September. Urban District Council. Electrical installations in houses on the Woodshutts estate. Wood, Goldstraw & Yorath, Victoria Chambers, Station Road, Tunstall, Stoke-on-Trent.

Luton.—2nd October. Housing and Estates Committee. Electrical cooking and water heating equipment for Council houses. (See this issue.)

South Africa.—PRETORIA.—22nd November. City Electricity Department. Supply of 255,250 ft of 33-kV, 3-core power cable. Copies of specification (£2 2s. per copy) from the Controller of Municipal Stores, Lorentz Street, Pretoria. We are informed by the Pretoria Electricity Department that a copy of the specification has been forwarded to the Export Promotion Department.

DURBAN.—12th November. City Electricity Department. 33-kV cable, combined pilot and telephone cable and requisite tools and appliances for jointing operations, sealing ends, joint boxes, etc. (E.P.D. 39838/48/Com./711.)*

Spalding.—27th September. Rural District Council. Electrically driven booster pump, with motor and time switch. Silcock & Simpson, 10, Park Row, Leeds, 1.

* Specifications may be inspected at the Export Promotion Department, Thames House North, Millbank, S.W.1.

Orders Placed

Aylesbury.—Bucks County Council. Accepted. Electrical installation at the Primary School, Oak Green.—Alpha Manufacturing & Electrical Co.

Darlington.—Corporation. Accepted. Improvements to the electrical installation at the technical college (estimated cost £1,442).—North Eastern Electricity Board.

Durham.—County Council. Accepted. Portable X-ray plant for the Holywood Hall Sanatorium (£336).—Victor X-ray Corporation.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Bedlington.—Disabled workers' factory; H E. Pitt, Ltd., builders, Millfield, Sunderland.

Beverley.—Houses (50), Swinemoor estate, in five groups; Anthony Steel & Owen, architects, Astragal House, 199, Anlaby Road, Hull.

Birkenhead.—Junior and infants' school for St. Werburgh's Church; Edmund Kirby & Sons, architects, 5, Cook Street, Liverpool.

Birmingham.—School, Small Heath (£25,000) for Church of Holy Family, Coventry Road; Peacock & Bewlay, architects, 83, Colmore Row.

Blaby (Leics.).—Houses (32); J. J. Derry, clerk to R.D.C., Council Offices, Narborough, Leicester.

Blackpool.—Houses (82), Grange Park estate; A. Hamilton, borough engineer.

Bolton.—Extensions to works, Delph Street and Longson Street; J. Lever & Sons, Ltd., Delph Street.

Brighouse.—Houses (18), Granny Hall Park site, for T.C. (£19,565); E. & F. Lapish, builders, Monton House, Halifax Road.

Brynmawr.—Factory and offices; Wales & Monmouthshire Trading Estates, Ltd., Treforest Trading Estate, Pontypridd.

Caernarvon.—Permanent houses (48), Maes Barcer; borough engineer, Guild Hall.

Canterbury.—Houses (54), Spring Lane; city architect.

Coventry.—Health centres at Bell Green and Green Lane, for T.C.; D. E. E. Gibson, city architect, 1a, Warwick Row.

Eastbourne.—Rebuilding 133-137, Terminus Road; Marks & Spencer, Ltd., Baker Street, London, W.1.

High Wycombe.—County primary school, Totteridge, for Bucks. C.C.; F. A. C. Maunder, county architect, Aylesbury.

Hitchin.—Permanent houses (40), Purwell Lane estate; U.D.C. surveyor, Old Town Hall.

Hull.—Workshop premises, Wyke Street; Steven & Rudd, 1/2, Staniforth Place, Hessle Road.

Liverpool.—Factory, East Lancashire Road, Kirkby; Imperial Chemical Industries, Ltd., Ship Canal House, King Street, Manchester.

London.—MAYFAIR.—Offices, Park Street; Thomas Braddock, architect, 14, Great Smith Street, S.W.1.

HOLLOWAY.—Flats (66), Sparsholt Street, for Islington B.C.; Harry Monson, architect, Finsbury Pavement House, E.C.2.

BLOOMSBURY.—Office block, Bloomsbury Way and New Oxford Street; Lewis Solomon & Son, architects, 21, Bloomsbury Way, W.C.1.

SHEPHERD'S BUSH.—School, White City estate (£60,160), for L.C.C.; county architect, County Hall, Westminster Bridge, S.E.1.

Luton.—Reconstruction of central youth headquarters (£25,000) for Beds E.C.; county architect, Shire Hall, Bedford.

Primary school, Leagrave, for E.C.; H. V. Lobb, architect, 20, Gower Street, W.C.1.

Maidenhead.—Houses (370), Curls Lane, Cox Green; borough engineer.

Malvern.—Building scheme at Malvern Theatre, for U.D.C.; J. Bulman, clerk of the Council, The Council House.

Manchester.—Flats (30), Upper Brook Street, Chorlton - upon - Medlock, for Blackpool Property Co., Ltd.; A. A. G. Toone, architect, 37, Princess Street.

Margate.—Factory, Ramsgate Road, for A.B. Metal Products, Ltd., Feltham; Shaw & Lloyd, architects, 74, Great Russell Street, W.C.1.

Melton Mowbray.—Girls' school for Leics. E.C.; county education architect, Greyfriars, Leicester.

Middlesbrough.—Houses (32) for the T.C.; R. H. Bailey, builder, Denmark Street.

Midhurst.—Secondary modern school, for West Sussex E.C.; F. Steele, county architect, Chichester.

Morpeth.—Houses (50), Broomhill, for the R.D.C.; T. Coates, surveyor.

Newcastle-on-Tyne.—Bus depot for the City Council; city architect, 18, Cloth Market.

Houses (14), Hawthorn Gardens; Cunningham & Forster, Hawthorn Gardens.

Offices for Rock Building Society, Market Street; L. J. Couves & Partners, architects, Carliol House.

Northallerton.—Police houses (6) for North Riding C.C.; J. Catchpole, County Hall, Northallerton.

Norwich.—Dwellings (178), in five groups, and nurses' home at County Mental Hospital, Thorpe; C. H. Thurston, county architect, Shire Hall.

Oldbury.—Houses (32), Birchfield Lane, Whiteheath; borough surveyor, Municipal Bank Chambers.

Oldham.—Houses (80), Limeside estate, Limehurst, for T.C.; G. Wimpey & Co., Ltd. The Grove, Hammersmith, London, W.6.

Day nursery, Honeywell Lane, Hathershaw, for E.C. (£6,000); Thorpe & Whyman, architects, Barclays Bank Chambers.

Oxford.—Secondary technical college; E. G. Chandler, city education architect, Town Hall.

Repton (Burton-on-Trent).—Houses (100) for R.D.C.; A. P. Hancock, surveyor, Council Offices, The Poplars, Rolleston Road, Burton-on-Trent.

Rotherham.—Bakery, Greasborough Road; W. J. Brookes & Son, Ltd., Skerton Road, Manchester, 16.

Scarborough.—County primary school, Newby, for North Riding C.C.; W. Tocher, architect, 8, Blenheim Terrace, Leeds.

Scotland.—Agricultural cottages (400), in Lothians, Ayrshire and Lanarkshire; architect, Scottish Orlit Co., Ltd., Edinburgh.

Smethwick.—Dwellings (60), and maisonettes (12), Church Road; R. Fletcher, borough engineer, Council House.

Stockport.—Works in Sheffield Street; B.D.L. (Stockport), Ltd., 222, Stockport Road, Cheadle Hulme.

Stretford.—Flats (42), Sandy Lane; borough engineer.

Sunderland.—Disabled workers' factory at Pallion; H. E. Pitt, Ltd., builders, Millfield.

Swansea.—Extensions to works, Upper Bank; I.C.I. Metals, Ltd.

Teddington.—Three blocks of flats, Anlaby Road; Watkin & Piazza, architects, 61, Clarendon Gardens, Wembley.

Thingoe.—Houses (25), for R.D.C.; E. G. Wilks, architect, 4, Market Street, Cambridge.

Walton-le-Dale.—Houses (240), Collin's Road, etc., for U.D.C.; S. Race, surveyor, Council Offices, Bamber Bridge, near Preston.

Wembley.—Extensions to works; Carpenter & Richardson, Ltd., engineers, Paduoc House, Beresford Avenue.

Whitby.—Houses (26), for the U.D.C.; Peacock & Bewlay, architects, 83, Colmore Row, Birmingham.

Willenhall.—Houses (50), Beacon Colliery estate, for U.D.C.; Harvey & Wicks, architects, 117, Hagley Road, Edgbaston, Birmingham.

Wrexham.—Three blocks of buildings (30 flats), Queen's Park site, for T.C.; H. Anthony Clark, architect, 1, Grosvenor Road.